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## CONTENTS


Editorial Notes ..... 113
An Episode and Its Morals ..... 113
A Disclaimer ..... 113
The Future of the Royal School of Mines ..... 114
Stocks ..... 114
Market Conditions ..... 115
Metallics ..... 115
*Sampling and Estimation of Ore ..... *Geo. A. Packard* 116
*Estimates of Ore Reserves ..... *Philip Argall* 116
Mine Sampling ..... *Richard A. Parker* 116
Ellershausen-Western Zinc Process ..... *Gilbert Rigg* 117
Discovery of Leadville ..... *Philip Argall* 117
Water in Veins ..... *V. G. Hills* 117
*Across the San Juan Mountains ..... *T. A. Rickard* 118
*History of the English School of Mines ..... 121
Mining in South Africa. III. ..... *J. H. Curle* 121
Blast Mains ..... 122
*Recent Roasting Methods at Butte ..... *H. O. Hofman* 122
Observations on the Mother Lode Deposits in California ..... *W. R. Prichard* 125
Production or Blue Vitriol Directly from Ores ..... 127
Canadian Iron Bounties ..... 127
Commercial Museum of the Philippines ..... 127
Earnings of Butte Copper Companies ..... 128
Bounties on Canadian Lead ..... 128
Iron Trade of Great Britain ..... 128
Abstracts of Official Reports ..... 128
Books Received ..... 129
Books Reviewed ..... 129
Recent Decisions ..... 130
Correspondence ..... 130
Questions and Answers ..... 131
*United States Patents ..... 131
British Patents ..... 132


*Illustrated.

## DEPARTMENTS


Assessments ..... 145
Chemicals, New York and Foreign ..... 143
Coins, Foreign ..... 144
Dividends ..... 145
Financial Notes ..... 144
Industrial Notes ..... 134
Markets: Coal, United States and Foreign ..... 141
Iron and Steel ..... 142
Metals: Gold, Silver, Copper, Tin, Lead, Spelter, Antimony, Platinum, Quicksilver, etc ..... 144, 145
Mining News: United States and Foreign ..... 137
Mining Stocks ..... 140
Obituaries ..... 133
Personals ..... 133
Schools, Technical ..... 133
Societies ..... 133
Stock Market Review: United States and London ..... 133
Stock Quotations ..... 146, 147
Trade Catalogues ..... 134


THE DISMISSAL of an assistant foreman at the Government Printing Office, Washington, because he had been expelled from the local labor union, suggests the lengths to which such organizations think they can go by setting up rules which contravene existing laws. In this case the foreman rendered himself objectionable by pointing out methods for reducing expenses in his department. For this act of duty, highly creditable to him, he was arraigned by the Union; notice was then sent to the Public Printer stating that the foreman was no longer a member in good standing, and his chief, the Public Printer, directed his removal. The foreman appealed to the President and the Civil Service Commission, with the result that he is now reinstated. Mr. Roosevelt, in his official letter on the subject, said: "There is no objection to the employees of the Government Printing Office constituting themselves into a union if they so desire; but no rules or resolutions of that union can be permitted to override the laws of the United States, which it is my sworn duty to enforce."

The incident discloses once again that the labor unions think that they can set up an *imperium in imperio*, and flout the laws of the State and the Nation. They should be undeceived in plain terms.

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COPPER PRODUCTION in Japan last year showed an increase of nearly 10 per cent. Recent rather wild statements, which have been made in some American papers, have called out a letter from Mr. Yukawa, Japanese Consul-General in New York. The production, according to his figures, amounted to 66,700,000 lbs. of refined copper in 1902, an increase of 5,830,000 lbs., or 9.6 per cent., over the previous year. Part of this was due to the adoption of improved methods at the mines; but a considerable part of it to the reopening of the Besshi Mine, which was disabled by a tidal wave in 1901. That mine produced last year 10,300,000 lbs. of copper, while the Ashio—the largest mine in the country—turned out 14,900,000 lbs. Japanese copper is in large part consumed at home, or sent to China, the exports to the West amounting to a moderate figure only. Besides the mines named, there are a number of smaller ones, the Japenese reports including 160 companies, which produce more or less copper. From the greater part of these mines only copper is obtained; though in some cases, the metal contains gold, silver and other values.

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THE LEGISLATURE of Cape Colony has pronounced against the admission of Chinese into South Africa, but the Natal Assembly has rejected a petition opposed to their importation. In the meantime the Railway Committee has been instructed to restrict the number of Kaffirs employed on railroad construction, so as not to hamper the mines. At Johannesburg the sentiment in favor of importing Chinese coolies is strengthening, as the white laborers are beginning to appreciate that the Chinaman will not compete with skilled workmen. Every effort is being made to solve the labor problem and, thereby, to remove the cloud which darkens the gold mining industry of South Africa.

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### AN EPISODE AND ITS MORAL.

The recent eclipse of a fine career, identified with the titanic growth of the iron and steel industry of this country, has evoked a good deal of moralizing of a thoughtful kind. Our view of the matter can be expressed by simile: During the recent automobile race from Paris to Madrid there were a number of fatalities, due evidently, in large part at least, to the fact that a machine rushing along an ordinary road at the speed of an express train is likely to escape the control of any man whose nerves are not under perfect command, and it is indeed doubtful whether any individual can be so sure of himself as to be always fit to guide an automobile at 60 miles an hour over a country road subject to disconcerting incidents which no one can foresee. The man who works his way by ability from inferior positions to the direction of big enterprises is like your chauffeur rushing across creation; he must have the most perfect control of himself. To go further, while the romantic rise of clever men from unimportant posts to positions of tremendous responsibility, within the space of a few years, is a great tribute to the equality of opportunity which this country offers beyond any other, nevertheless, such incidents as have illuminated the character of several of the steel magnates, at Chicago as well as at Pittsburg and New York, emphasize the fact that human nature remains the same; too much alfalfa will founder a horse; too sudden wealth unbalances most men.

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### A DISCLAIMER.

Under "Correspondence" we publish a disclaimer from Mr. Robert T. Hill. It will always be a pleasure to this JOURNAL to protect professional men when their names are dragged without warrant into the schemes of promoters.

It frequently happens that reports are misused.

An engineer examines a mine in 1903, for example, and reports that the ore reserves amount to about two years' supply for a 40 stamp-mill. This ore is all used up subsequently, and the mine, we will suppose, makes a poor showing by the end of 1905. In 1906 a promoter comes along, and by the aid of the engineer's favorable report, made in 1903, he, in 1906, peddles enough shares to make a good thing out of it. The engineer may be unaware of the use to which the report has been put, and if he does learn of it, and protests, it is unlikely that he can undo the harm already accomplished.

Another iniquitous practice is that of quoting from a report without regard to the context, so that an engineer is made responsible for inferences which his statements do not justify. Even reputable financiers are known to be careless in this regard.

A third method of over-riding the conservatism of careful professional men is to engage an engineer to inspect a mine, and pass upon it for a valuation which is reasonable; then the report, couched in terms expressing confident expectation of successful exploitation, is made to do duty in the flotation of the property for a price or for a capital much greater than the amount upon which the report was based. A man can see many good points and a reasonable margin of profit in a mine valued at $100,000, while he will see many weak features and not much assurance of a successful venture when the price is $250,000. If you are buying a horse for a valetudinarian you may find a gentle cob just suited to afford early morning exercise to an invalid; and the price may be about right to your way of thinking, but if the same animal is offered to you for cross-country riding or steeplechasing your expressions concerning him will put on another color, and the price previously quoted will seem impossible. Something of the sort has been known to happen in mining transactions. By substitution of a high for a low capital, a good venture becomes a losing enterprise, and a sound report is stultified. Thus reputations have been mangled to suit the exigencies of finance. We invite our engineering friends to use this JOURNAL whenever they desire to clear up such entanglements as that to which Mr. Hill makes reference in his letter.

The average man with a scheme usually considers "experts," as he calls them—but which they never dub themselves—an unreasonable kind of people. To him the reputable mining engineer is an overcautious, nervous person who is afraid to launch out into those gorgeous prophecies which are essential to a mining fakir. Let him think so; the profession has no relations with him, and the industry daily suffers by his trickeries. An engineer who is docile to such gentry is in a bad way; they are best avoided. It is not too much to say that the reputation of the mining engineer and metallurgist in consulting practise is his capital and his honor; it will be the heritage of his children.

## THE FUTURE OF THE ROYAL SCHOOL OF MINES.

It was anounced on June 27, through the medium of a letter from Lord Rosebery, that London is to have an aggregation of technical schools at South Kensington, and it is understood that this so-called "new Charlottenburg" will absorb the Royal School of Mines. To put it briefly, it is the last stage in a process of swamping the Royal School of Mines, a process which has been going on steadily, if not stealthily, ever since the Jermyn Street establishment was broken up, in 1880, and it became the annex to a training institution for government teachers, departing from the original plan, more and more, until now it is to lose all its identity by becoming merged into a central technical college as comprehensive as it is heterogeneous.

Professional men on this side will sympathize with their friends in England in deprecating the final spoliation of the only school in the British Empire which is worthy to rank with the Columbia School of Mines, the Boston Institute of Technology, the Schools of Mines of Michigan, California and McGill universities. Moreover, the Royal School of Mines is the senior of them all, with traditions worthy of the great industry to which it ministers. If our engineering friends on the other side of the Atlantic do not make their influence felt by outspoken opposition to this final obliteration of a historic school, we shall have a poor opinion of the kind of manhood which has blazed the trail for civilization and done the pioneer work of the British Empire. That the gentlemen of the Institution of Mining and Metallurgy who have labored in the cause of technical education meant well by concurrence in this grandiose idea of a nondescript technical college we do not doubt, but it seems to us very clear that, for want of a definite plan, they have been won by the officials who control the Science and Art Department of the British Government into agreement with a scheme which is worse than even the unsatisfactory and crippled condition which has marked the Royal School of Mines during recent years. Nor has this happened for want of examples of something much better; the relation existing between the leading American schools of mines and the universities to which they are affiliated could have been imitated to advantage by establishing a similar connection with the University of London, but first of all dropping the South Kensington entanglement with its training school for board-school teachers, breaking away from that amorphous establishment and crystallizing out into a distinct school for the education of mining and metallurgical engineers, and mining geologists; in other words, by returning to the ideal of a School of Mines and not a Normal School of Science, a College of Chemistry, College of Science or any other nohdescript kindergarten, such as is now supposed to minister to the needs of the mining industry of the British Empire.

On another page we publish the historic record of the institution for which we are pleading. It is pitiable to think that a school identified with such men as De la Beche, Murchison, Ramsay, Forbes, Percy, Tyndall and, above all, with the greatest scientific teacher of the nineteenth century, namely, Thomas Henry Huxley, should be driven from pillar to post. And if noble traditions do not stir the blood, then we venture to reiterate the statement that the future of the British Empire is menaced by the disregard of special education; it is known to every one, except some Englishmen, that Germany and the United States have quite out-distanced England in the opportunities afforded to the youth of the respective countries to learn their professions thoroughly and well. It has been proved to a humiliating degree on the great gold-fields of the Transvaal, where American engineers have been given the largest share of important posts, simply because, in their country, they were able to acquire a thorough preliminary training followed by practical apprenticeship in the field. On the other hand, it is a no less striking fact that of the accepted text-books on mining and metallurgy the largest proportion are the work of graduates of the English School of Mines; this, in itself, speaks strongly for the academic training of the authors, and suggests that if the School did but afford an education more in touch with the actualities of work in the field, it would take a place second to none in the engineering talent which it could turn out, for the development and beneficiation of an empire which controls the largest share of the mining regions of the world.

There is only one course to follow. Return to the old ideal of a metropolitan school of mines. What this is, can be stated in the words of the Prince Consort, who, when opening the Museum of Practical Geology, in May, 1851, said that it was intended "to direct the researches of science, and to apply their results to the development of the immense mineral riches granted by the bounty of Providence to our Isles and their numerous colonial dependencies." These dependencies are now mining regions of imperial size, and the Providence to which the Prince referred has seen fit to add the Transvaal to the possessions of England. Prince Albert's words evidently have not lost in breadth of meaning by the lapse of half a century.

Public spirit has been awakened in this matter; several of our American engineers connected with English financial houses have taken a generous interest in endeavoring to make the School more efficient, and behind them there have been rich men willing to supply the necessary funds. What is now needed is some one big enough, like Cecil Rhodes, or a group of men sufficiently large-minded and large-hearted, to endow a School of Mines affiliated with the University of London, but no longer entangled with the heterogeneous medley of technical kindergartens at South Kensington, not swamped by "a general elementary science school" as Ramsay, Percy and Smyth insisted thirty years ago, but a strong separate well-equipped college which shall train the men needed to direct the work of the mine and of the smelter in the remotest parts of the earth.

## STOCKS.

The liquidation in Wall Street still continues, and this week has seen prices for stocks, especially industrials, lower than have been recorded for a long time; moreover, at the present writing, the movement does not appear to have ended, and stocks are still dropping. It does not appear, however, that the fall is the result of a general want of confidence, such as we saw in the panic times of 1893. At that time, the fall in stocks was accompanied by almost a total deadlock in business of every sort; manufacturing ceased, railroad earnings diminished, and the number of unemployed workmen in all trades was enormous. Prices of all kinds of material fell for want of demand; in a word, we had hard times in every department of trade and business. This is far from being the case, at the present time. Manufacturers are generally very fully employed, railroad earnings are enormous, money for construction and other purposes seems to be abundant, people are generally free from debt, and trade is in a prosperous condition. The current crop reports indicate that abundant harvests are secure, and that the prices of most of our exports will be maintained at a high level.

In ordinary times a persistent fall in stocks at such a time would be something altogether anomalous, which could not be explained by any of the customary rules. In the present instance, the fall on the exchanges seems to be due to a variety of causes, into all of which there is not time or space to go. In a general way, it may be said that we are now witnessing a reaction from the period of inflated credit and extravagant speculation which reached its height somewhat over a year ago. Consolidation in

all directions, the formation of innumerable corporations largely financed on borrowed money, and the sale of heavily watered stocks at inflated prices have produced the natural result, and it is extremely fortunate for the country that this has come at a time when conditions outside of the stock markets were such that the reaction has not produced a general panic.

The enormous corporations which were floated two years ago are, with some notorious exceptions, in a fairly sound condition. The heavy loans with which their flotation was involved, and which were largely made abroad, are now being gradually drawn in. Fortunately for trade, the banks recognized the position some time ago, and began a drastic process of curtailment in their speculative loans—which was bad for the speculators, but an excellent thing for sound business. It has enabled them to assist in the repayment of the large sums which were borrowed in France, a process now going on; and it is understood that the renewal of some of those loans has also been secured, though at rather heavy rates of interest.

As is usual at such times, the reaction has gone rather too far. While many of the combinations and holding companies are only reaching their true level, these have undoubtedly fallen to a lower point than is justified by the situation. This, however, is inevitable in all times like the present, and will doubtless re remedied when the stock markets settle into a saner condition.

While all stocks have felt the reaction, it is encouraging to see that there is some discrimination. Some combinations which have been managed on sound business principles, and have not been afraid to take the public into their confidence by making full reports. These have in some measure resisted the fall, or have felt it least, and are in a position to recover easily. On the other hand, the "blind pools" are suffering from the public ignorance of their condition, and seem unable to find bottom in the general rush.

There has never been a time, as we have indicated above, when Wall street has had so little effect upon general business. Of course, the depression on the exchanges is felt to some extent; but not by any means to the degree which might have been expected. This is partly due to the great activity in manufacturing, which has prevailed during the past two or three years. Manufacturers and business men generally have been fully occupied, and have found use for all the money which they could obtain. It would have been better if bankers had recognized this fact more fully than they have done in the past, and had begun, at a much earlier date, to limit their speculative commitments. That they have recognized it now is fortunate for the community at large.

## MARKET CONDITIONS.

The metal markets are generally quiet, and the same causes are operative which have been felt for some weeks past. The decline on the stock exchanges, the apparent determination of all consumers to adhere to a waiting policy, and the vacation season, combine to produce rather a depressed condition of affairs.

Copper is again slightly lower in price, and business has been rather of a retail order. Such purchasers as are in the market are buying only in limited quantities, and usually for immediate delivery. Manufacturers continue generally busy on contracts, although new orders are reported rather scarce. Indications are that their stocks are rather low, and such purchases as are made are generally accompanied by orders to hurry forward the metal. Orders from abroad are rather more plentiful, and, like those received at home, are generally for immediate delivery. It is evident that stocks are low, and the question is how soon the necessity for replenishing them will force purchases on a larger scale.

Tin has been dull, with comparatively little business doing. Sales have been usually of small lots to fill the immediate requirements of consumers.

In lead, business continues good, with a fairly steady consumptive demand. Deliveries of the metal continue very slow, and in some cases, premiums have been paid on small lots, which were urgently needed by buyers.

Spelter is strong, and consumption continues to be slightly ahead of production. A short supply of ore at the smelters, and some labor troubles in the West have made the metal rather scarce, and prices have strengthened accordingly.

Silver continues dull and uninteresting, with only a temporary spurt in price. European orders have generally been filled, and business for the East is not especially active. Indian buying has been rather light, though the demand for China and the Straits is somewhat better.

The iron markets still continue quiet, and consumers are still holding back. In pig iron, business has been largely in moderate-sized orders for early delivery, which is now obtainable without difficulty. In finished material conditions are very much the same, although structural material shows a better demand, with the probable approaching settlements of the building trade troubles.

The Western coal markets continue unchanged, with good supplies for city and local trade. Trouble is beginning to be felt in the Lake trade, however, and deliveries of coal at the Lake ports are not being made as freely as shippers would wish for. In the South, the strike of the Alabama miners is still unsettled. Negotiations are going on, however, and there is a prospect of agreement on the mining rate at an early date.

The Atlantic seaboard bituminous trade continues in unchanged condition; the only incident is a little more complaint about delay in shipments to tidewater. Demand is generally good, and prices unchanged.

The anthracite trade also shows no change in condition. Local demand is good at all points and shipments from the mines continues steadily. Domestic demand continues unusually large for the season, and all coal shipped is promptly taken up.

## METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Wisdom is knowing what to do. Skill is knowing how to do it, and virtue is actually doing it, while religion is the working theory of why it ought to be done.

The movement of the inorganic world is obvious and palpable, and may be likened to the minute-hand of a clock, the progress of which can be seen and heard; whereas the fluctuations of the living creation are nearly invisible and resemble the motion of the hour-hand of a timepiece.

The great difficulty of science is in tracing every event to those causes which are in present operation; the hypothesis of evolution is analogous to what is going on now.

The investigation of Nature is an infinite pasture ground, where all may graze, and where the more bite, the longer the grass grows, the sweeter is its flavor and the more it nourishes.

If individuality has no play, society does not advance; if individuality breaks out of all bounds, society perishes.

The great problem of that social chemistry which we call politics is to discover what desires of mankind may be gratified, and what must be suppressed, if the higher complex-compound society is to avoid decomposition.

That which is to be lamented is not that society should do its utmost to help capacity to ascend from the lower strata to the higher, but that it has no machinery by which to facilitate the descent of incapacity from the higher strata to the lower.

The higher the state of civilization the more completely do the actions of one member of the social body influence all the rest, and the less possible is it for any one man to do a wrong thing without interfering, more or less, with the freedom of all his fellow-citizens.

Every society, great or small, resembles such a complex molecule, in which the atoms are represented by men possessed of all those multifarious attractions and repulsions which are manifested in their desires and volitions, the unlimited power of satisfying which we call freedom.

It has been stated by an eminent authority that the cyanide process "has done more than all other recent processes combined for cheapening the production of various metals, increasing the gold supply of the world and advancing the standard of our progress and civilization."

The first recorded attempts to apply cyanide to ore treatment were by an inventor named Simpson, of Newark, N. J., who patented a process in 1885, followed by a process patented by Jules Rae, of Syracuse, N. Y., in 1887. The first really successful cyanide process applied on a large scale was that introduced by the McArthur-Forrest patent of the same year.

In a course of lectures delivered before the Engineering Society, of Birmingham University, Sir Oliver Lodge recently advocated the use of the steam turbine. He expressed a belief that the turbine engine of the future would use gas rather than steam.

It would seem to be to no purpose that the history of every branch of physical and historical science teems with examples of the fate which befalls the hasty generalizer, who numbers, rather than weighs, supposed facts, and treats the rough approximations to truth obtained by the observations of highly complex phenomena as if they had the precision of geometrical theorems.

Everyone who is conversant with things, and not merely with what is more or less properly said about things, is aware that most widely received propositions, even in many branches of physical science, may be only approximately true; and that if a chain of deductions of unusual weight is to be suspended from any of them, it is highly needful to examine it afresh in order to see whether it will bear the strain—whether, in fact, it is accurate enough for the new purpose to which it is to be put. For ordinary purposes, a foot-rule is an accurate measure, but it does not follow that it will suffice for ascertaining the exact length of the base line of a trigonometrical survey.

## DISCUSSION.

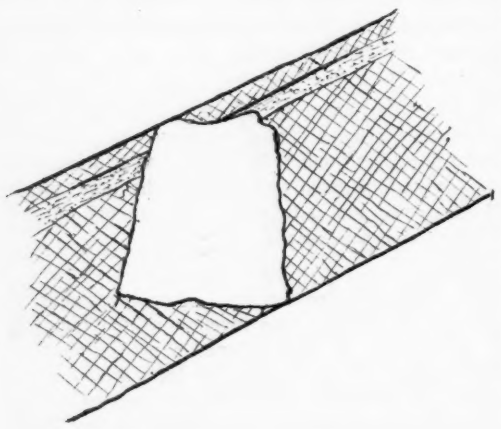
Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

### SAMPLING AND ESTIMATION OF ORE.

*The Editor*:

Sir.—Owing to absence I have but recently had the pleasure of reading the extremely valuable articles on "The Sampling and Estimation of Ore in a Mine." I trust this may serve as an excuse for the following rather belated suggestions:

In the consideration, on pages 362 and 363, of the much discussed question of High Assays, the statement is made that "the occasional barren and the occasional high assay returns are not comparable in their effect upon the estimates." While this statement is true in the majority of cases, especially in the sampling of gold mines, it must be evident that the effect of the abnormally high or low assay would depend entirely upon the ratio which such assay has to the average. Thus, in the series of samples and assay returns, given on page 363, to demonstrate the above statement, if all three abnormal results, one very high and two very low, are omitted, the average becomes slightly less than 1.25 oz. per ton. The abnormally high assay, 27.4 oz., is 26.15 oz. higher, or approximately 2,100 per cent greater than the average, while in the case of the two low assays the total of the variation of both from the average is



only 2.5 oz., or 200 per cent. Of course the effect of these assays upon the average is increased or decreased when the width covered by the sample is considered, but the above is sufficient to illustrate why such abnormal high assays "affect the estimates . . . . . to an extent by no means comparable to the omission of an equal number of poor results." That the occasion may arise wherein the elimination of a low assay would affect the result as much, or more, than the omission of a high assay is indicated by the following series based upon an examination of a silver lead property:

| Property: Number. | Width. | Oz. Silver per ton. | Foot-Ounces. |
|---|---|---|---|
| 1 | 5.3 | 57.4 | 304.22 |
| 2 | 4.9 | 39.2 | 192.08 |
| 3 | 4.6 | 53.1 | 244.26 |
| 4 | 4.0 | 59.6 | 238.40 |
| 5 | 4.0 | 101.3 | 405.20 |
| 6 | 4.2 | 54.9 | 230.58 |
| 7 | 4.9 | 42.8 | 209.72 |
| 8 | 4.7 | 1.4 | 6.58 |
| 9 | 4.5 | 38.2 | 171.90 |
| Total | 41.1 | | 2,002.94 |

The average of the ore, using all of these results, is 48.7 oz. per ton. If No. 5 is omitted, this falls to 43.0 oz. per ton, while if the low assay is omitted, the result becomes 54.8 oz. per ton. None of these assays can be considered abnormal, nor is the effect of the elimination of either very large, with silver at 53c. per oz. In this particular instance, however, the effect was further emphasized by the fact that the sample containing 101.3 oz. silver per ton also assayed 63.0 per cent lead and 5.5 per cent zinc, while the sample containing low silver contained 3.5 per cent lead, and 11.4 zinc, the latter an especially objectionable feature.

In Mr. Argall's letter in the issue of June 13, Fig. 2, he shows what he truthfully states to be "one of the most difficult samples to take." When the vein assumes a flatter dip, as in the accompanying figure, it becomes practically impossible to secure a fair sample clear across the vein, and it is better to sample in sections, being careful to get a straight line across each section. I find it desirable to take samples very largely in sections if there is any difference in the parts of the vein which is clearly observable by the eye. In the examination of properties not equipped with treatment plants, where the metallurgical side of the question is necessarily an important one, results so obtained are of especially great assistance. Of course this increases costs.

This term "Unequipped Property" suggests another point, though perhaps it is beyond the pale of a discussion on the sampling of a mine. Mr. Denny remarks that when the engineer is called upon to decide whether a "prospect" is valuable or otherwise, and the available data are meager, he is "forced to one or two alternatives, either (1) to intuitively sum up the value of the property; or (2) to refuse to commit himself to an opinion until more work is done." Now some of us who have not yet reached the *Ultima Thule* of being retained entirely by corporations which purchase only "going properties" are, unfortunately, not infrequently, called upon by the man who, on the advice of "a friend who has seen it himself," has put money into a mine until he is tired and wishes to know what he has got. As. Mr. Denny states, we are too judicious to adopt the first of the above alternatives, and Mr. Silkmerchant, who employs us, will not be satisfied with the second. It seems to me there is a third possibility, which perhaps, after all, is a combination of the other two. Why not state to Mr. S. that the present value of the property is only the small amount in cash which some development company would pay, advising from our experience what this might be, and admitting that from the information obtainable we can not express an opinion as to probable future value. Tell him it is "a gamble." By all means let us force upon the investing public, if possible, the difference between mining speculations and mining investments. Since, however, we estimate "possible ore" and "probable ore" may we not state definitely and succinctly, guardedly, the possible future value that might be expected from the expenditure of a stated sum in a certain definite development, which, so far as possible, is outlined in the report? To be sure, if this sum is expended and the property fails to come up to our guarded expressions of possibilities, we are liable to be blamed, especially by this class of clients; but, as Mr. Rickard has said "difficulty and doubt" have to be faced, and "judgment and experience must decide."

GEO. A. PACKARD.

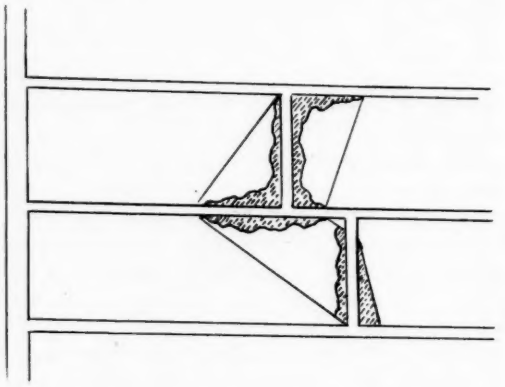
Baker City, Ore., July 11, 1903.

### ESTIMATES AND ORE RESERVES.

*The Editor*:

Sir.—Mr. Collins now defines his position as objecting to "the same expressions to denote estimates of ore in a pockety fissure vein and a comparatively regular impregnated bed, merely because both are exposed on one, two or more sides." Here we differ radically, assuming, for the sake of argument, such an unusual phenomena as a "comparatively regular impregnated bed"; the engineer would use a lower factor of correction in dealing with the latter than in the case of a pockety fissure vein, to the end that in either case his estimates may be as near correct as he can get them. So long as mines are developed by levels and winzes, or the counter-part of the latter, raises, the present method of estimating ore reserves in blocks will in all probability prevail and a block with all sides exposed will also receive a higher estimate than those with one or more concealed sides. In my definition "ore developed" I stated that as a general rule "the smaller the blocks of developed ore the more accurately can their contents be estimated"; suggesting as a safe rule in such matters that the length of a block should not exceed twice its depth. Within the limits I gave, there is nothing very rigid about this. Then it must not be forgotten that other classifications are provided to cover cases of incomplete development; consequently I cannot see where the so-called "cast-iron" definition comes in, unless it is the requirement that first-class reserves should have no concealed sides.

It is good business, and good mining also, to know, within the limits of commercial accuracy, what materials or ore one can safely depend on; taking stock does not directly increase the profits in any business, yet it is usually considered imperative at certain intervals. Turning now to the hypothetical ore-body (Fig. 2 of Mr. Collins) to which I am again referred, I desire to state that there is no evidence in the sketch to justify one in assuming that the outer lines drawn by Mr. Collins to represent the boundary of the ore-body have any foundation in fact. Considering the peculiarity of the assumed form of the ore-body and the development given, I would construct the outline of pay-ore as shown in the accompanying



sketch, and, while this would give about 60 per cent less than Mr. Collins finds, I believe it is as much as a careful engineer dare allow on the development outlined.

PHILIP ARGALL.

Denver, Colo., July 11, 1903.

### MINE SAMPLING.

*The Editor*:

Sir.—In answer to Mr. W. L. Austin's queries in the JOURNAL July 11, I would say that the original sample was broken to about ½ in. before quartering and rolling began; the final samples were broken to between ¼ and ⅛ in. In a more or less clayey mass which had been rolled frequently it is impossible to say when the concentration took place, if indeed it was a concentration; the more the sample was rolled wet as taken from the face, the greater the tendency of the gold wires to find lodgment in the soft duck, or in the clayey film that readily forms after frequent rollings of such samples.

The differences in assay value were due to the greater number of gold particles in one sample than the other, and the reason these particles were not more uniformly distributed by rolling was due to the sticky nature of the material sampled.

Any one at all familiar with the auriferous schists of the Mother Lode of California would readily see the importance of the suggestion made: the difference between ordinary gold quartz and the schists named is apparent and readily accounts for the greater ease with which the gold particles lean the sample in the latter case.

The point I wish developed is the danger of quartering down ores carrying free gold, wet or damp, and doing this upon the ordinary canvas such as is generally used for such purpose; it is difficult to properly clean the canvas after each sampling owing

to the sticky, clayey material that fills the interstices of the duck, and particles of gold left from one sample may be incorporated in the following one, thus rendering one too high and the other too low by the value of the gold misplaced. The samples should be fairly dried and then quartered upon canvas having an enameled surface.

RICHARD A. PARKER.

Saranac Lake, N. Y., July 17, 1903.

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THE ELLERSHAUSEN-WESTERN ZINC-WHITE PROCESS.

*The Editor*:

Sir.—I regret that I have been unable to reply sooner to Mr. Walker's letter in your issue of May 30. I was not aware when I last wrote that Mr. Walker was limiting his remarks to ores containing only traces of copper. I am still at a loss to follow the ammonia-recovery process. If distillation is not resorted to at all, it seems to me that dilution of the working solution is bound to occur. The washings from the insoluble part of the ore, the zinc hydrate precipitate and the calcium sulphate precipitate, are surely going to cause a very considerable dilution of the solution. As regards what takes place during precipitation of the zinc-ammonium-sulphate solution by ammonia, I can only say that I have precipitated similar solutions under very diverse conditions, as to temperature and strength, and invariably obtained basic sulphate of zinc as described in my letter.

As to the alleged advantage of acid ammonium sulphate over sulphuric acid as a leaching agent, I say again that solutions can be readily obtained free from iron, with sulphuric acid of a strength quite sufficient to make their subsequent treatment feasible. I note that Mr. Walker agrees with me as to the defective color of the zinc white obtained by this process.

Lastly, no reference is made in either article or letter to the difficulty of completely extracting zinc from ores, where much pyrites, or other iron compounds capable of forming ferric oxide when roasted, is present.

In his letter, then, Mr. Walker limits the application of this process to ores in which iron is practically the sole soluble constituent besides zinc; he bases his claim to the superiority of acid ammonium sulphate over sulphuric acid as a leaching agent on alleged defects in the behavior of the latter, which, in my opinion, it does not possess; he makes no mention of the main difficulty in all processes designed to treat zinc ores in the wet way: The low yield of zinc in presence of much iron.

Under the circumstances I see no reason to depart from the opinion expressed in my last letter.

GILBERT RIGG.

Hounslow, England, July 7, 1903.

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THE DISCOVERY OF LEADVILLE.

*The Editor*:

Sir—I cannot accept Mr. Spurr's version of the discovery of Leadville. Whatever halo of romance may enshroud the finding of ore on Fryer Hill, the discovery of Leadville proper was the result of much labor and intelligent prospecting. It is true that in the early days the placer miners were bothered somewhat with the heavy carbonates settling in their sluices; yet according to Mr. Emmons[1] these very prospectors knew, as far back as 1861, that some of this bothersome ore ran 164 oz. silver to the ton, but even ore of that grade was of no economic importance in the wilderness at the head of the Arkansas, 42 years ago. If Mr. Spurr had given us a résumé of the Hayden Survey of this district,[2] what the United States geologists had to say about the stones the sluicers rejected, which later became the foundation of Leadville's greatness; where, in their opinion, this ore came from and the prospects of finding payable veins in the neighborhood of the placers; it would have greatly aided in comparing the prospectors and geologists of 30 years ago, as factors in practical mining, and would have added largely to the interest of this discussion.

It appears to me that Mr. Spurr has confounded the discovery of ore on Fryer hill in 1877 with the discovery of Leadville, which, I take it, properly dates from the time carbonates were found in place on Rock Hill in 1874. The principal claims of the Iron Silver Mining Company were located along the contact outcrop on Iron and Rock hills in 1875 and 1876 as the result of intelligent prospecting by men who had evidently a clear idea of what they wanted. As early as 1876 a shipment of about 300 tons of carbonate ore was sent out to Colorado Springs, the nearest railroad point; the freight alone amounting to $25 per ton. This latter year also saw the discovery of the Camp Bird Mine by the Gallagher brothers, a phenomenally rich and by no means accidental find, judging from the story related to me by one of the brothers, in New Zealand in the year 1884.

From the foregoing statement it is evident that Leadville was discovered by intelligent miners and prospectors long before the potent influence of the Tabor whiskey-jug disturbed the equilibrium of the Fryer hill prospectors, or the maladroit practice of Chicken Bill called the world's attention to the fact that almost any old prospect hole in Leadville might develop into a bonanza.

PHILIP ARGALL.

Denver, Colo., July 15, 1903.

[1] Geology and Mining Industry of Leadville, 1886.
[2] Geological and Geographical Survey of the Territories, 1874.

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WATER IN VEINS.

*The Editor*:

Sir.—In compliance with your favor of June 6, I enclose the Cripple Creek water data in tabular form.

Since, under the peculiar conditions developed in this district, it is the relative sea level elevations and not the depths below the several shaft collars which constitute the most important comparison, I have put both in this table, and you can cut it down as you see fit.

V. G. HILLS.

Cripple Creek, Colo., July 6, 1903.

(We are under obligations to Mr. Hills for this valuable array of data upon an important subject. In our next issue we expect to publish an abstract from the annual report of the Portland Gold Mining Company, in which Mr. Hills discusses the water problem at length. These data will all prove useful in determining the nature of the water zone in veins.—EDITOR.)

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BELGIAN BUYING OF GERMAN IRON.—The Sambre & Moselle Company, of Montigny, Belgium, is the purchaser of a large quantity of pig-iron from German works, for delivery between the present time and the end of June of next year. The amount of 25,000 tons has been ordered of the Bergische Huttenverein, of Hochdahl, and a further contract for 20,000 tons has been placed with the Eschweiler Bergwerks Huttenverein.

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*WATER RECORD OF MINES AT CRIPPLE CREEK, COLORADO.*

| NAME OF SHAFT. | Elevation of Collar. | Elevation of first Water. | Depth of first Water. | Elevation at which max. flow of water was Struck. | Depth of max. Flow. | Max. flow gals. per Minute. | Elevation of present Water. | Present discharge gals. per Minute. | Elevation of Sump. | |
|---|---|---|---|---|---|---|---|---|---|---|
| Abe Lincoln | 9,618.28 | 9,490 | 128 | 9,268 | 350 | 500 | 9,108 | ... | 9,093 | Stationary. |
| Ajax | 10,115.17 | 8,975 | 1,140 | 8,914 | 1,201 | 22 | 8,997 | 22 | 8,885 | |
| American Eagles | 10,756.54 | none | .... | .... | .... | .... | .... | ... | 9,256 | Dry. |
| Anchoria Leland | 10,146.46 | 9,493 | 653 | 9,396 | 750 | 550 | .... | ... | 9,036 | Dry. |
| Blue Bird | 10,403.87 | 9,064 | 1,340 | 9,064 | 1,340 | .... | .... | ... | 9,033 | Dry. |
| Clyde | 10,092.43 | 9,586 | 506 | 9,480 | .... | 150 | unknown | ... | 9,280 | Stationary. |
| C. O. D. | 9,828.58 | 9,499 | 330 | 9,479 | 350 | 560 | .... | ... | .... | Dry. |
| Eclipse | 9,696.24 | 9,546 | 150 | 9,546 | 150 | 10 | 9,344 | 5 | 9,190 | |
| Elkton | 9,741.22 | 9,430 | 311 | 8,952 | 789 | 2,150 | 9,024 | ... | 8,775 | |
| El Paso Consl. | 9,377.47 | unknown | .... | .... | .... | 600 | 8,801 | 300 | 8,801 | |
| Findley | 10,405.54 | none | .... | .... | .... | .... | .... | ... | 9,110 | Dry. |
| Gold Coin | 9,771.80 | 9,403 | 368 | 8,770 | 1,000 | 900 | 8,663 | 740 | 8,572 | |
| Golden Cycle | 10,072.82 | unknown | .... | .... | .... | .... | .... | ... | 9,173 | |
| Gold King | 9,859.37 | 9,359 | 500 | 8,973 | 886 | 750 | 9,020 | ... | 8,951 | Stationary. |
| Independence Consl. | 10,286.33 | 9,730 | 556 | 9,059 | 1,227 | 70 | 9,059 | 70 | 9,007 | Stationary. |
| Isabella | 10,467.15 | 9,557 | 910 | 9,455 | 1,012 | 1,300 | 9,357 | ... | 9,339 | |
| John A. Logan | 10,478.70 | none | .... | .... | .... | .... | .... | ... | 9,079 | Dry. |
| Last Dollar | 10,285.00 | 9,065 | 1,220 | .... | .... | .... | .... | ... | 9,017 | Dry. |
| Lillie | 10,229.19 | 9,716 | 513 | .... | .... | .... | 9,021 | ... | 8,703 | Drained by Vindicator. |
| Mable M. | 9,500.40 | unknown | .... | .... | .... | .... | unknown | ... | 8,986 | Unknown. |
| Mary McKinney | 9,540.30 | 9,505 | 35 | 9,061 | 479 | 1,400 | 9,026 | ... | 8,931 | Falling 0.03 ft. per day. |
| Midget | 9,803.20 | .... | .... | .... | .... | .... | .... | ... | 9,037 | Same water elevations as Moon Anchor. |
| Moon Anchor | 9,871.73 | 9,496 | 376 | 9,248 | 624 | 1,100 | .... | ... | 9,037 | |
| Morning Glory | 9,728.20 | unknown | .... | 9,028 | 700 | 1,890 | 9,026 | ... | .... | Falling 0.03 ft. per day. |
| Orpha May | 10,545.25 | none | .... | .... | .... | .... | .... | ... | 9,281 | |
| Portland No. 1 | 10,089.31 | 9,459 | 630 | 9,290 | 800 | 3,260 | 9,007 | ... | 8,969 | Falling 0.03 ft. per day. |
| Portland No. 2 | 10,251.33 | .... | .... | .... | .... | .... | 9,007 | ... | 8,969 | Falling 0.03 ft. per day. |
| Portland No. 3 | 10,339.51 | none | .... | .... | .... | .... | .... | ... | .... | |
| St. Patrick | 9,622.37 | 9,379 | 243 | 8,922 | 700 | 30 | 8,980 | ... | 8,910 | Stationary. |
| Stratton's Indep. | 9,850.63 | 9,576 | 275 | 9,576 | .... | unknown | 8,450 | 300 | 8,450 | Part plugged. |
| Strong | 9,762.99 | 9,062 | 700 | 8,862 | 900 | 500 | 8,879 | 200 | 8,859 | |
| Vindicator | 10,216.32 | 9,716 | 500 | 9,019 | 1,197 | 800 | 9,019 | 300 | 9,017 | |
| Wild Horse | 10,659.85 | none | .... | .... | .... | .... | .... | ... | 9,410 | Dry. |
| Blue Bell Tunnel | 9,342 | .... | .... | .... | .... | 200 | .... | ... | .... | |
| Ophelia Tunnel | 9,275 | 9,292 | .... | .... | .... | 2,000 | .... | ... | .... | |
| Standard Tunnel | 9,034 | .... | .... | .... | .... | 18,000 | .... | ... | .... | |
| Newell Tunnel | 8,937 | .... | .... | .... | .... | none | 8,941 | ... | .... | |
| El Paso Tunnel | 8,790 | .... | .... | .... | .... | .... | .... | ... | .... | |

VICTOR G. HILLS,
July 6, 1903.

## ACROSS THE SAN JUAN MOUNTAINS.

By T. A. RICKARD.

(*Continued from page 84.*)

The descent to Telluride was tedious, for it meant leading our horses most of the way—and some horses are particularly slow to be led however willing to be ridden; besides, the drop from the top of the range to the valley is just five thousand feet in the course of five miles. All the way down one passes mines and mills; of the latter the new Tomboy mill in Savage basin loomed conspicuous through the dusk.

At first sight it seems curious to build a large mill at an altitude of nearly 12,000 ft. instead of choosing a site in the valley and transporting the product of the mine over an aerial tramway. This is a much-mooted question. As a rule the valley site is preferable, because of the availability of a water-supply, the greater cheapness of fuel for power and heating purposes, the nearness to a base of supplies, the facility which the tramway itself gives for transmitting materials up to the mine, the more kindly conditions of living for workmen, etc. If water can be secured at the mine the erection of a mill close-by saves the cost of a tramway, that is, an amount ranging, say, from $20,000 to $50,000, but the water-supply of the high altitudes is so closely dependent upon melting snows as to be uncertain, unless a reservoir or natural lake affords a chance for storage. Of course, if the mill is at the mine, the concentrates have to meet the cost of carriage to the valley and this can be, in part, set off as against the expense of tramming the ore itself to the mill, if situated at a lower level. The Tomboy pays $2.75 per ton for packing concentrates from the mill to the head of the valley, at Pandora, and as the ore yields from 8 to 12 per cent of concentrates this cost represents about 25c. per ton of crude ore. The item of fuel for motive power is eliminated by the electric transmission of power. Blacksmith coal is carried, by the pack train, to the Tomboy at a cost of $8.00 per ton, an amount one-half of which represents the expense of transport. The mill and other buildings are heated by steam; in some cases by low-pressure boilers, in others by high-pressure boilers with reducing valve. In summer 40 tons of coal are consumed per month; in winter, 200 tons per month. Coal costs an average of $10 per ton, delivered at the mine. Water for milling purposes is obtained from Lake Ptarmigan, by a pipe line 1¾ miles long.[1] The lake is just over the range and only 350 ft. below the crest, so that the light pumps are sufficient. These are operated by electricity, which is bought from a large power company in the valley, at the rate of $80 per h.p. per annum. The Smuggler-Union Mine, which has its own generating plant, pays only $35 to $40 per h.p. per annum, but as against this, of course, is offset the interest and redemption of the capital used for an expensive installation. On the whole, therefore, it may be said that the comparison of conditions affecting the operation of a mill in the valley and that of a mill at the mine is without decisive result and depends entirely upon local factors. One of these is the ability to secure a good millsite at a reasonable price. Another possible factor is the snowslide. To a stranger the interruption and damage from this source would seem to present a very serious obstacle to the use of a tramway. It does, but to the same extent it affects all the operations in a precipitous snowy mountain region. Last spring[2] the Smuggler-Union tramway was stopped for several weeks as a consequence of the damage done by a slide and during the same season the Liberty Bell mine-buildings were swept away so that the mill was idle for four months. In the latter case 18 lives were lost, and the majority of these belonged to rescue parties who set out to the aid of those who were caught by the first slide. Successive avalanches entombed the rescuers.

SAVAGE BASIN, TELLURIDE, COLORADO.

As a rule, it is possible to predict the track of a snowslide, because they commonly follow the line of destruction marked out by them in previous years, but, as a matter of fact, the great injury to life and property due to snowslides is just the one which is caused by the unexpected slide which takes an entirely unsuspected line of descent. Such was the cause of the Liberty Bell catastrophe, for, of course, the buildings were erected at a spot confidently believed to be immune from such a danger.

The destructiveness of a snowslide must be seen to be appreciated; buildings and tramways are as toys before its fierce oncoming and men in the path of its descent are as straws in a whirlwind. In fact much of the damage is due to the vacuum caused by the rapid motion of a mass of snow and the cyclonic disturbance which follows in its wake. I have often watched them descending a neighboring ravine when myself out of all chance of danger. The thunder of its tempestuous descent first calls one's attention and then one sees the mass of snow gathering underlying rocks, uprooting trees, amid a quickly gathering mist of snow particles driven fiercely by the whirlwind in the rear. The rushing mass will not stop at the bottom of the slope but its momentum will carry it some distance up the opposite declivity, while all the forest trembles and the air is darkened with a snow-mist.

The stretch of country covered by Marshall and Savage basins, and thence to the valley at Pandora, has seen many a snowslide. A long tale of woeful fatalities and romantic heroism could be told concerning these three or four miles of mountain land.

In the cemetery at Telluride there are many large graves inclosing the remains of groups of unfortunate miners who were swept into eternity by the fateful avalanche. Their resting places are unadorned by showy tombstones or grandiose epitaph, but close-by a new white marble monument attracts the passer-by to read the inscription upon its face. It tells a startling story to those who can read between the lines. In July, 1901, the management of the Smuggler-Union Mine introduced the system of working by contract, a system which results in paying a workman according to his work and which therefore is directly opposed to the underlying principle of unionism, which demands an equal wage for the idle and the energetic, the capable and the incapable. There was a strike, the members of the union, for the most part, refused to work, while a large proportion of experienced miners accepted the contract system and remained at the mine. On the 3rd of July, the eve of the Declaration of Independence, a body of strikers attacked the mine, shot indiscriminately into the bunkhouses, offices and other buildings, succeeding in killing eight non-union men and in driving the remainder over the range. In this cowardly assault one striker was shot. It is his tombstone that so conspicuously adorns the Telluride cemetery; upon it there is this inscription: "Erected by the 16-to-1 Miners' Union in memory of (then follows the man's name). Born in Koojoki Wora, Finland, Died at Smuggler, Colo., July 3, 1901, aged 27 years." Then follow these noble lines of Longfellow:

> "In the world's broad field of battle,
> In the bivouac of life,
> Be not like dumb driven cattle—
> Be a hero in the strife."

This—this is the prostitution of poetry! Remember, too, that no one has ever been punished for the murdering of the eight miners killed on that same day, while the one murderer, killed in the act, is commemorated in marble and in poem!

This intolerable outrage emphasizes the conditions of affairs in this district. There has been a manly effort made by three or four of the mine managers to protect the rights of property and good citizenship, but it has been handicapped by the interference of political considerations. Mr. A. L. Collins, the manager of the Smuggler-Union Mine, told me of the receipt by him, from the secretary of the Union, of a list of "Scabs," namely, men who refused to accept the edicts of the Union—16-to-1 Union, if you please!—and this list was interesting because the names upon it could be pronounced!—that is, they belonged to men of American and English descent, as against the bulk of the miners in the district who are Austrians, Italians, Slavs, etc. Mr. Collins inserted a paid advertisement in each of the local papers promising work at the mines under his charge to any man on that list.

The above lines had just been written, on November 19th, when the news of the assassination of Mr. Collins shocked the whole profession of which he was so honorable a member. I have elsewhere[3] expressed my feeling concerning this tragedy. It is a bitter price to pay for frontier lawlessness and that political expediency which holds the law bound in its slimy coils.

The mine which was the scene of these unhappy doings in one of the largest in Colorado; it was discovered in 1875, when one of the claims, the Sheridan, was first located. A stray occurrence of the mineral sylvanite, the telluride of gold and silver, was the cause of the naming of the mining camp. The lode proved remarkably persistent in richness

[1] The line starts with a 5-in. pipe, which is reduced to 4 ins. at the summit; from the summit to the mill it is reduced, gradually, to 2½ ins. For these and other data I am indebted to Mr. John Herron, the manager of the Tomboy mine.

[2] The writer refers to 1902.

[3] The editorial on the "Tragedy at Telluride" in the ENGINEERING AND MINING JOURNAL of November 29, 1902.

through the Mendota, Sheridan, Smuggler and Union claims, and beyond them into other mines; it has been traced for over four miles on its strike and it has been continuously stoped along one portion for a length of 5,000 ft. The Smuggler lode has yielded altogether about $12,000,000. It cuts through the crest of the range at 13,200 ft., where it is encased in rhyolite; at 12,450 ft. it passes into a sheet of augite-andesite which is 550 ft. thick, and below this it goes through the great series of andesitic breccias which reach down to the San Miguel conglomerate, at an altitude of 10,000 ft. The variation in geological environment has not been without its effect upon the character of the vein. Mr. Collins informed me that the payable part of the vein reaches up to the rhyolite cap, the limit of productiveness coinciding to a remarkable degree with the base of the rhyolite, where the vein becomes pinched, a mere persistent parting easily discernible even at a distance on account of the discoloration of the encasing rock. In the rhyolite, the vein is accompanied by a little mud or selvage and some silver ore, in patches,[4] but no cellular quartz such as can be seen lower down. This bit of evidence does not favor the idea of a secondary enrichment of the lower ore-bodies by means of the removal of values in the uppermost portions of the vein. In the augite-andesite the bonanza ore-bodies occur, the richest masses of silver ore coinciding roughly in their distribution with certain harder, almost horizontal, layers of this andesite. Similarly, in the underlying breccia, which is fine-grained, the pinches in the vein occur along nearly level lines coinciding with the bedding-planes of the country. Good ore makes in zones, but oxidation reaches downward irregularly, and does not coincide with enrichment.

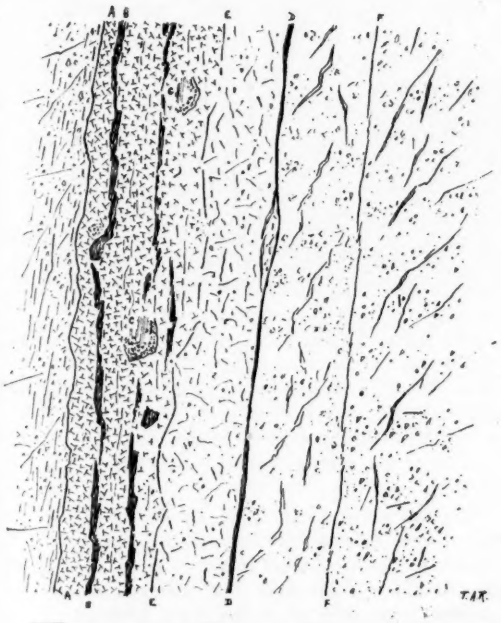



FIG. 4

The Smuggler vein, as the drawings will show, is notably banded; the hanging is usually well-defined and carries a casing, immediately underneath which a persistent quartz-leader is generally to be seen. This leader is the first part of the vein to show oxidation. The footwall is "frozen" with quartz stringers, which merge into the country. The general structure of the vein suggests multiple fracturing with but slight actual displacement, and a shattering of the rock without much actual crushing. Vugs, or crystal-lined cavities, are frequent; they are due to crustification, or crystal-lined growth, around the sides of spaces separating pieces of broken rock.

The accompanying drawings were made underground during a visit in 1901; Fig. 4 represents the back of a stope at the ninth level. On the hanging there are quartz seams, A A. This is usually the rich streak; if any free gold is to be found in the lode, it will be found there. The quartz is white and rather massive, with crystalline vugs which are frequent. The next band, B B, is a strip of hard country, included in the vein; the part E to D is also breccia, with some quartz; the footwall country, D F, is full of quartz stringers which drop into the vein; the outer country contains vugs and some quartz. On the hanging there is a soft shaley band, about 3 ft. wide, which is used by the miners as a "shooting course," that is, it is recognized as an easy line of fracture and separation between the ore and the rock.

Fig. 5, obtained in a neighboring stope, suggests the arrangement of ore in relation to the bedding of the breccia. The hanging wall leader is represented by the stringer B B. A B is a casing of soft shaley country corresponding to the "shooting course" described in connection with Fig. 4. D D are seams of white quartz carrying ironstained vugs. E E is a quartzose band. The included country in the middle of the vein, from B to E, is mottled by brecciation and does not contain as much quartz as is usual. The footwall is hard.

The lode yields a wonderful array of fine crystals of quartz, siderite, calcite, argentite, rhodochrosite, gold and silver. The transparency of most of these, especially the quartz and the siderite, suggests an extremely slow process of crystallization. Siderite, the carbonate of iron, occurs in handsome yellow crystals encrusting both quartz and calcite. Calcite was the last mineral to be precipitated and it is found lying upon the quartz which lines the geodes or vugs. Rhodonite, the silicate of manganese, occurs in irregular bands, usually on the footwall or else in the main body of the pay-ore. Rhodochrosite, the carbonate of manganese, is occasionally seen in rose-red crystals. Gold is found in crystalline aggregates forming specimens of great beauty. Wire gold also occurs. Both the wire and the crystalline gold have the composition of the true alloy, Au Ag.[8] In the upper workings the native gold is purer.

While the lodes of the vicinity, as a rule, have the general structure of sheeted bands of country rather than that of large fault-fractures, it is a fact that several of the poorer veins follow pronounced lines of faulting. I measured the vertical dislocations, which coincided with the Contention and the Allegheny veins; in the first case the displacement was 58 ft. and in the second it was 21 ft. The Pandora faults the Smuggler about 50 ft.[6] The Virginius vein is faulted twenty feet by a crossvein.[7] In these cases it is the poor vein which follows the fault.

*(To be continued.)*

SMUGGLER LODE FIG. 5.

BLAST FURNACES IN BELGIUM.—The number of furnaces in blast in Belgium on July 1 was 33, against 30 at the corresponding date last year. The capacity is estimated at 2,555 tons of iron per day, against 2,010 tons a year ago. Three of the furnaces were reported as making foundry iron, eight forge iron and 22 bessemer and basic pig.

IRON ORE IN GREAT BRITAIN.—The London *Iron and Coal Trades Review* reports that the recent find of iron ore at the Roanhead mine, near Barrow, will be of great importance to the iron trade of the Furness district. The shaft sunk at Roanhead struck a large body of ore. A drift, run from the shaft nearly 1,000 ft., was in solid ore all the way. The deposit almost approaches the Park mine, from which a great quantity of ore has been taken.

[4]Mr. John E. Farish has since informed me that in the adjoining ground, of the Humboldt mine, he found that these patches of ore in the rhyolite indicated ore-bodies in the underlying andesite.

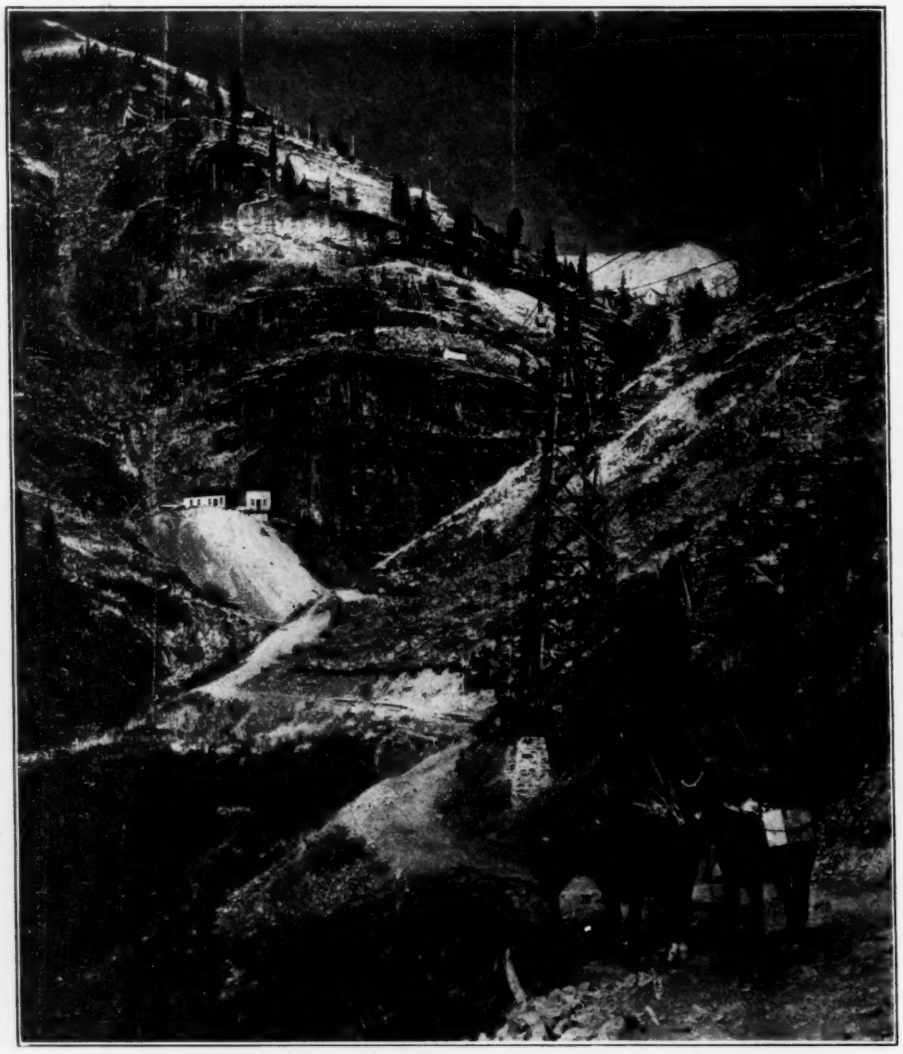
[5]A fact determined by the late Arthur L. Collins, who gave me many of the data contained in this description of the Smuggler-Union.

[6]John A. Porter. "The Smuggler-Union Mines, Telluride, Colorado." *Transactions* American Institute of Mining Engineers. Vol. XXVI., page 452.

[7]C. W. Purington. "Preliminary Report on the Mining Industries of the Telluride Quadrangle, Colorado." Page 837.

## MINING IN WEST AFRICA.*

It is difficult to arrive at even an approximate estimate, but it is a fairly safe statement that the railway and mines together give employment to about 50,000 men, of whom more than half are imported. The last Gold Coast census—which was only a partial attempt at numbering the people, anything like accuracy being an impossibility in a country where the census is regarded by chiefs and people as but a preliminary to additional taxation—induces the belief that the total population of Gold Coast Colony is any number from 4,000,000 to 6,000,000. It is certainly a thickly populated country for its size, but, as with nearly all African communities, the people, especially the men, are the reverse of industrious, and, in fact, they are constitutionally averse from labor of all kinds, save that which is essential to find them in food and the scanty clothing which contents them. Still, in such a populous community it should not be extraordinarily difficult to obtain and organize labor in the future, and it is the future which has to be considered. There is every reason to anticipate that the mining industry of Gold Coast Colony will largely develop, and will offer employment to an army of native laborers. The question is, will that army be forthcoming? The Fantis, a very large tribe, living near the coast, are an extremely fine body of men physically, though, in consequence of their constitutional cowardice, they were never at any time a match for the aristocratic and warlike Ashantis, who for a long series of years fought and conquered them again and again, and massacred them wholesale, or cast them into slavery. There is, perhaps, no more shiftless, thriftless, idle fellow in Darkest Africa than the Fanti, and he is, as a rule, as greedy and dishonest as he is idle and worthless. He knows all about concession-mongering and selling, and even "salting," alleged gold mines. There are up-to-date "syndicates" in some of the smallest Fanti villages, promoted by frock-coated, bell-toppered, patent-leathered "buck-niggers," who have obtained their education in one of the Government schools, which tend to make the black man more idle and useless even than he was before civilization was known in his country. Nothing has yet convinced the Fanti of the dignity, or even the necessity of labor, and probably nothing will. As in South Africa, polygamous practices provide him with a number of domestic and agrarian workers, and he lives and fattens on the fruits of their labor.



ON THE ROAD TO THE SMUGGLER-UNION MINE, TELLURIDE.

*From the London *Economist*, June 27, 1903.

## THE ZINC INDUSTRY OF UPPER SILESIA.

According to the *Statistik der Oberschlesischen Berg- und Hüttenwerke* for 1901 there were in operation in Upper Silesia in that year 23 smelters which produced 107,967 metric tons of spelter, 1,867 tons of zinc dust, 1,182 tons of lead and 13,144 kg. of cadmium. Five rolling mills consumed 36,241 tons of spelter and produced 35,272 tons of sheet, besides 301 tons of lead and 393 tons of dross and ashes. The total production of lead (obtained in refining the crude spelter) was therefore 1,483 tons, or a little less than 1.4 per cent of the spelter, indicating a lead tenor of approximately 2.5 per cent in the crude spelter. The total quantity of ore smelted was 551,087 tons, indicating a yield of approximately 19.6 per cent zinc, which would correspond to a tenor of upward of 25 per cent zinc in the calcined or roasted ore; but these figures are inexact, since, although most of the works report roasted blende, a few report only the quantity of raw blende. The amount of calamine smelted was 219,332 tons, which illustrates the steadily decreasing importance of this kind of raw material, since the consumption in 1900 was 239,758 tons, against 250,828 in 1899 and 265,326 in 1898.

The status of the smelting practice is best illustrated by the individual statistics of various works, rather than by computation of the averages of all.

The Bernhardihütte, which is one of the most recent constructions in the province, has eight Siemens furnaces, each 80 muffles. In 1901 there were smelted 15,066 tons of calamine, 8,065 of roasted blende, and 64 of zinc ashes, etc., a total of 23,195. The consumption of cinder (reduction material) was 9,241 tons, or 40 per cent of the weight of the ore. The total consumption of coal for heating purposes was a little less than 1.33 tons per ton of ore. The consumption of fire clay was 0.08 ton per ton of ore. The yield of spelter was 4,157 tons, or a little less than 18 per cent. The total wages paid was 168,340 marks, or 7.26 marks per ton of ore. (A mark = 23.8 cents.)

The Carlshütte has 10 Siemens furnaces, each of 32 muffles. The quantity of ore smelted was 5,354 tons of calamine and 2,127 of roasted blende, a total of 7,481 tons. The consumption of cinder was 4,857 tons (65 per cent) and of fuel (entirely slack), 12,804 tons, or 1.71 tons per ton of ore. The consumption of fire clay was 0.09 per ton of ore. The yield of spelter was 1,266 tons, or about 17 per cent. Wages came to 106,141 marks, which was 14.19 marks per ton of ore.

The Clarahütte had in operation 12 direct-fired furnaces with a total of 304 muffles, and smelted 4,041 tons of calamine, 3,436 of roasted blende, and 287 of other products, a total of 7,764 tons, which yielded 1,364 tons of spelter, or approximately 17.5 per cent. The consumption of cinder was 0.56, of fuel (entirely slack), 1.55, and of fire clay 0.116 ton per ton of ore. Wages amounted to 14.3 marks per ton of ore.

The Franzhütte, having eight gas-fired furnaces, with an aggregate of 280 muffles, smelted 3,785 tons of calamine, 2,935 of roasted blende, and 309 of other products, a total of 7,029 tons, which yielded 1,177 tons of spelter, an average of 16.7 per cent. The consumption of cinder was 0.44, of fuel, 1.58, and of fire clay 0.135 ton per ton of ore, while wages amounted to 10.3 marks.

The Guidottahütte, with gas-fired furnaces, smelted 17,899 tons of calamine, 18,643 of roasted blende, and 1,012 of other products, a total of 37,554, which yielded 6,681 tons of spelter and 451 tons of zinc dust. The consumption of cinder was 0.46, and of fuel 1.53 tons per ton of ore, while wages came to 12.08 marks.

The Hohenlohehütte, with 72 gas-fired furnaces and a total of 2,304 muffles, smelted 32,847 tons of calamine, 24,706 tons of roasted blende, and 1,791 tons of other products; a total of 59,344 tons, which yielded 11,958 tons of spelter, or a little more than 20 per cent, besides which 540 tons of zinc dust were obtained. The consumption of cinder was 0.575, of fuel 1.92, and of fire clay 0.132 per ton of ore, while wages averaged 14.17 marks. Of the clay consumption, 0.105 ton per ton of ore was for muffles, and the remainder for condensers.

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IS IT POSSIBLE?—No less an authority than the London *Colliery Guardian* says that Col. Bulazek, manager of "some large Russian coal mines," reports that a miner was discovered in an abandoned shaft where he had strayed 50 days before he was found, having been without food, drink, light, or sufficient air for that entire period. He was unconscious, and almost every particle of flesh had wasted from his body; but the hospital surgeons say that he may recover.

We are not informed as to the location of the mines, or as to the credibility of Col. Bulazek; but the story indicates that the Russian miner must have had a great deal of reserved vitality.

## THE HISTORY OF THE ENGLISH SCHOOL OF MINES.

The Royal School of Mines is an offshoot of the Geological Survey of Great Britain and Ireland. In 1837 the founder of the Survey, Sir Henry De la Beche, established a "Museum of Practical Geology" for the housing of the collections belonging to the Survey. In 1851, a period marked by the awakening of the educational spirit in England, a series of lectures was inaugurated at the Museum, the teaching staff consisting of members of the Survey, notably such men as Ramsay, Warington Smyth, Robert Hunt, Percy, and Edward Forbes. De la Beche was made director of the school. It was a brilliant array of men of the highest character. In 1853 the Survey, the Museum and the School of Mines were united under a "Science and Art Department," a new name was given to the school, one or two more distinguished men joined the staff; in 1854 Huxley became lecturer on Natural History. In 1855, on the death of De la Beche, Sir Roderick Murchison became director, and in 1856 the school was put under control of an

THE ROYAL SCHOOL OF MINES, SOUTH KENSINGTON.

Education Department; this was done much to Murchison's regret, who voiced the fear, amply warranted by future events, that the officials who control the general educational system of the nation would not appreciate the relative importance of the practical branches of science. In 1857 Tyndall became one of the lecturers, and another change was made in the name of the school. In 1862 a third change was made, and this time it became the "Royal School of Mines," the course of training was lengthened to three years and the title of "Associate of the Royal School of Mines" was granted to graduates.

Meanwhile the idea of establishing a general college of science at South Kensington had begun to take root, and it was finally advocated by a Royal Commission appointed in 1870. This was a critical period. The school became merged in a general elementary college of science, it was dissevered from its geological associations and, instead, was utilized for the training of teachers for the board schools. Sir Warington Smyth, Dr. Percy, Sir Andrew Ramsay and Prof. Robert Hunt drew up a protest. In 1872 several departments were moved to South Kensington; in 1877 and 1879 the geological and metallurgical departments left the old Jermyn street building for their new quarters at South Kensington. Percy, who was strongly opposed to the removal, resigned in 1880. He had made the school famous by his lectures on metallurgy. In 1876 Professor Judd succeeded Sir Andrew Ramsay in the chair of geology.

During the ten years preceding 1880, the continued uncertainty and unrest had crippled the school; after further re-organization it became in October, 1881, the "Normal School of Science and Royal School of Mines." Huxley became Dean. Owing to the general dissatisfaction on the part of the students to the name "Normal School of Science," it was change in 1890 to the "Royal College of Science," the standing of the Royal School of Mines being unaffected thereby.

During recent years the attendance has been large, to the point of overcrowding. The lecture-rooms and laboratories are scattered over several buildings and galleries, only one of which has any character—and that is a fine building, as shown in the annexed illustration. The endowment has been miserably small, and only a small part of it is applied to the School of Mines itself—that is to the special training of mining engineers and metallurgists. The teaching, despite several men of the highest authority in the scientific world, notably Prof. Judd, who still fills the chair of geology, suffers from the fact that many of the professors occupy several government positions, so that only a part of their time is given to the school and there is not that stimulating interest which is necessary to good work.

Two years ago a protest was made against the conditions just referred to, especially as regards the metallurgical department, and a good deal of anxiety as to the welfare of the school was awakened among professional men. The leading members of the Institution of Mining and Metallurgy took up the matter, with the result that a committee was appointed, with Mr. Hennen Jennings as leader, and a report was made by the council of the Institution to the council of the School of Mines. It was well received and further action was promised. Nothing definite, however, was announced until, on the 27th of June, Lord Rosebery made the statement that certain public spirited men, notably Messrs. Wernher and Beit, had offered to contribute £300,000 for the erection of buildings if the London County Council would give £20,000 to the cost of maintenance. The new scheme contemplates a consolidation of various technical institutions; among these the School of Mines will form an insignificant part.

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IRON IN RHODESIA.—The London *Engineer* says that, under the auspices of the Rhodesia Railways, an expert is about to leave England with a view to examining and reporting on the iron deposits of Rhodesia, the design being to start a big iron industry, taking full advantage of the supply of Wankie coal, and of the electrical power which can be obtained from the Victoria Falls.

## MINING IN SOUTH AFRICA—III. TRANSVAAL CONDITIONS AND MANAGEMENT.

By J. H. CURLE.

Facilities for mining in the Transvaal I would describe as normal. The climate is perfection. Native labor is good, but, unfortunately, far too scarce. There is sufficient rainfall to give a moderately good water supply, which most of the mining companies conserve in large dams. The Vaal River is not more than 40 miles from the Rand, and, if necessary, the mines could combine in a pumping scheme which would put the water supply beyond doubt.

Water is not available as power, but, as against that, there are extensive coal-fields. Since its earliest days the Rand has been supplied with a good steam coal, mined within 20 miles of the gold-fields. Most of the mines are now connected to the main railway by sidings, which run alongside their coal-bunkers. The flatness of the country does not permit of the use of gravity in laying out the plant.

Timber is not required at all in the levels, nor, to any large extent, in the stopes except for stulls. A quantity of trees were planted years ago, and the supply of small mine-timber is likely in future to be furnished locally. Dynamite, now that the monopoly is removed, should cost less than on most fields.

Underground conditions are normal. There is little water, and pumping is a relatively small item. The rock is not excessively hard, and good average progress is made by air-drills. As against this the beds are often faulted, or dislocated by dikes, making mine development a heavy item. Beds are often narrow, and in stoping do not break cleanly to the walls; this necessitates the inclusion of a lot of waste with the ore. Sorting belts are used, but only in part neutralize this defect.

The ore is easily treated. It is stamped moderately coarse, and yields 60 per cent of its contents on the plates. The tailings are sized, and the sands put through ordinary cyanide treatment. The slimes, at least on the richer mines, are agitated and cyanided; but this treatment, to my mind, has not been a success, and I venture to say that $3 slimes are as yet of no commercial value on the Rand. The serious drawbacks to cheap working are, first, that the country does not produce food, and, second, that it is so far from the coast, from whence railway freights are excessive. Thus all mine supplies cost, landed, several times the original figure, and the cost of living for the working man is abnormally high. While this state of affairs continues it will not be possible to introduce skilled white miners, and without their assistance the best work cannot be done. Taxation of 10 per cent on profits is a somewhat heavy item.

Balancing the conditions for mining in the Transvaal—the good with the bad—I believe they show a normal state of affairs. From experience gained on nearly every gold-field in the world, I am led to think that the short ton of ore costs, under normal conditions, $6 to treat, and that is therefore the average figure I should expect to see as the cost in the Transvaal. As a matter of fact I believe the average cost there works out at about $6.75. It is perhaps fair to make allowance for the present scarcity of labor, and the disorganization caused by that, and to assume that when the mines are working under a full labor supply they will show lower costs; but it will take a good deal of improvement to lower the average figure to the normal $6 mark. Some of the bigger mines, of course, work below this figure already; but not many. Managers and directors have a habit of publishing figures which look well, but these are often only the bare cost of treatment. When development is added, also the cost of local and London offices, directors' and engineers' fees, additions to plant, repairs, the tax on profits, and the hundred other expenses incidental to a full and accurate statement, their figures are hardly recognizable. When I say the mines should work for $6, I mean that figure in reality, after all out-

lay; I don't believe in sophistry where working costs are concerned.

On the whole, the mine management in the Transvaal is not, in my opinion, the best. There are many mines in the States or Mexico where I have seen better work, and even in despised Westralia I know half a dozen mines which, as regards management, put the Transvaal in the shade. In a word, the management is extravagant. It is not really bad, and would probably satisfy most people; but it doesn't lead the world.

Let me give an example of what I mean. A few years ago I became managing director of a colliery not far from the Rand. At that time it was just entering the market as a producer; there was active competition to face, and at the mine itself, owing to a mass of unsold coal littering the surface, there was chaos. When we got the railway siding in, things went better, and the coal began to sell. After a month or two, as the output grew, and the sales increased, I saw our working costs coming into line with the other collieries. But I wanted to make that the most economically handled mine in the Transvaal. The output still grew, thanks to an energetic salesman; and the working costs got lower still. At last I was seriously put to it to find any item that could be cut down. Underground the limit seemed certainly to have been reached. Here and there on the surface a chance offered. The local butcher wished to renew his contract for supplying meat to the Kaffirs, and after a heated interview he got it—at a reduction of 2c. a pound. One day I had a triumph. The Kaffirs are great medicine drinkers. They insist on having copious drafts, by day or night, of any drink they may fancy, and if they didn't get it, they would go off in pique to another mine. The local chemist's monthly bill was appalling. I sent for him, and after lengthy expostulations on his part, made him sign a contract which saved us $100 a month. These two reductions, of Kaffir meat and medicine, saved us, as nearly as I can remember, 1c. a ton on cost of production. One of my last efforts was as regards candles. Here the manager (a most capable Scotchman) at last protested. He said we couldn't burn less, and I said we might enquire. He then used some strong language; but I stood at the top of the shaft for two hours as the Kaffirs came up, and after searching four or five hundred, carried into the manager's office two pails full—a fair percentage being whole candles which the Kaffirs had saved up for burning in their huts at night! These things may appear trifles. But by this time we were producing coal at 24c. a ton less than our neighbors. We were able, as the result, to go into the market and undersell them, and we got contracts for as much coal as we could handle. Before I left Africa we were mining and developing, sorting out 10 per cent on belts, and dumping the clean coal into the railway trucks for a cost of 54c. a ton, (a figure our rivals could not approach), and we were selling 40,000 tons a month.

The lesson I draw from this is that the management out there is not the very best. Our mine had not better facilities than the others, but we put more energy into it, and because of that we took their business. These were, of course, coal mines, but the same moral holds good with the gold mines. With real energy behind them, and directors who are not lethargic millionaires, or their satellites, cheaper work could be done. But under the present rule of the great financial houses you will never see really very cheap work.

I am told that, since the war, the standard of management shows an all-round improvement; but I am a little sceptical. One item, for example, where great savings could be effected, is in a state of reciprocity between adjoining mines; but, as yet, this does not exist. The savings under this head—on a field where it costs often $3,000,000 to equip a single mine—might be immense. A shaft might often be dispensed with; a joint mill and treatment plant, with shops, dam, and general surface works might serve two mines. There are dozens of ways in which reciprocity might make great savings. But the big houses which control most of the mines don't see this, or it doesn't suit their books. Albu, perhaps, won't work with Farrar, or Wernher and Beit with Barnato, or Goerz with the Goldfields, or Neumann with Freeman-Cohen, or J. B. Robinson with anybody. I reckon, that because of this all-round aloofness, they spend millions of pounds every year in unnecessary plants and equipment, and every ton of ore treated afterwards has to pay the penalty. Now and then managers or engineers may go to the Rand intending to put energy and individuality into their work, and show record improvements in costs; but they soon get down into the whirlpool. Capital is too strong for them; money to sink in the mine is thrown at them; and in the end they perpetuate the traditions of extravagance for which the Rand is celebrated.

The American has played a great part in the development of the Transvaal mines, and to-day holds most of the big positions. He has left his mark as a brilliant judge of machinery or as an engineer gifted with financial genius, rather than as a mine manager. He is imaginative, and takes at the same time a broad grasp of the position; but in the detail work of management, where a concentration of character is necessary, he has not shown to equal advantage. Far be it from me to decry that wonderful product of the age, the California-reared mine manager; but I class equally with him many Britishers. As mine managers we can show fine men, on the Rand or elsewhere; but we lack that mining instinct, that knowledge of values, and that grasp of the whole mining horizon which so many of the American engineers possess. America is a metal mining country, and England is not. We have not in England the mining atmosphere which is ever present in the States; and it is because of this, not from any inherent defects of mind or character, that we are handicapped in the race.

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## BLAST MAINS.

Pipes for the transmission of air in metallurgical works are made usually of galvanized sheet iron, closely riveted and soldered at the joints. The gauge of the iron should vary according to the size of the pipe. For low pressures, a pipe of 54 in. diameter should be of No. 18 gauge, while pipes of 42 in., 30 in., and 24 in. should be respectively of No. 20, 22, and No. 24 gauge. For higher pressures, such as are used in lead smelting, heavier iron should be employed. Thus, it is recommended that a main blast pipe of 60 in. diameter should be made of as heavy as No. 8 steel.

In putting up blast pipes, care should be taken that there be no sharp angles or turns. Stove pipe elbows, so-called, should always be avoided and turns of direction of 90° should be constructed, in the case of round pipe, with at least five pieces, and a radius of curvature of the inner side of the elbow at least equal to the diameter of the pipe. This proportion of radius to size holds whether the pipe be round or rectangular.

Branch pipes should not butt squarely into the side of the main pipe, but a branch nipple should be cut into and securely attached to the pipe at an angle of 45°, the remainder of the change in direction being made by the use of a half elbow. After taking out the branch, the main pipe may be reduced in area to correspond with the less quantity of air it has to carry, but the reduction in area should be very gradual, the common practice being to make the taper equal in width to a sheet of galvanized iron, which with the usual 30 in. wide sheet will give a net length of 28 in. when the pipe is put up.

Wherever a division of the main pipe is to be made, a breeching piece should be put in, constructed so as to divide the air currents in such a way that it will be split equally by the opposing acute angle.

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## RECENT ROASTING METHODS AT BUTTE.*

By H. O. HOFMAN.

The metallurgical processes in the Butte District show much uniformity with regard to the general principle on which they are based. They comprise roasting, smelting, converting, electrolytic refining and casting. There is considerable diversity in the details of practice.

First-class ore, forming about 10 per cent of the product of the mines, is, as a rule, smelted raw, and furnishes the desirable coarse ore of the blast-furnace charge. Concentrates, coarse limestone and converter-slag are the basic fluxes added to slag the siliceous gangue. In one instance, some first-class ore is roasted in lump-form in stalls. This makes it less refractory than raw ore, and, furnishing available iron, permits the running of slags richer in iron and hence more fusible than would be otherwise possible.

Heap-roasting, which was practiced in the early days, has been entirely abandoned.

In crushing, the copper-silver ores readily break into small grains, making often more fines than can be carried by a stall or even by a blast-furnace. This necessitates separating part of the fines by screening; the screenings going into the fine-ore roasting-furnaces.

The fine-ore furnaces are represented by four types, the Allen-O'Harra, the Wethey, the Pearce and the MacDougall; long-hearth reverberatory furnaces used in early times, having been given up entirely.

The most recent developments in roasting practice are represented by successive modifications of the MacDougall furnace. This is a vertical cylindrical furnace with arched horizontal hearths having discharge openings alternately near the center and periphery, and a central revolving shaft with horizontal radial stirring arms, which are provided with teeth placed at an angle to the arm. The teeth of the arms on the even-numbered hearths are set in a direction opposite to that of the odd-numbered, thus, on the odd-numbered hearths they push the ore toward the center, and on the even-numbered toward the side. The ore, fed mechanically into the furnace, is delivered continuously onto the outer edge of the first hearth, when the teeth of the stirring arm turn it over and work it toward the center, where it drops through an annular opening onto the second hearth; the arms of this turning the ore over and over will convey it slowly to the openings near the periphery, through an annular opening onto the second hearth; on until it arrives on the closed bottom, where it falls through drop-holes into a hopper.

The ore, spread evenly over the hearth, thus travels in zig-zag through the furnace, passing from periphery to center and vice versa. It is warmed at the top of the furnace, it then ignites and burns freely, and, lastly, most of the sulphates formed are decomposed lower down. The air necessary for oxidation is admitted through doors in the side, most of it entering on the bottom hearth. The gases, and with them the dust, pass upward through the ore-discharge openings, and are drawn off through pipes in the roof. In starting, the furnace has to be heated up to the kindling temperature of the ore, which, if rich enough in sulphur, will burn of its own accord without the use of any carbonaceous fuel. If too low in sulphur, the heat necessary for successful roasting has to be supplied by one or more external fireplaces.

Three kinds of MacDougall furnaces interest us here. The original MacDougall, the Herreshoff and the Evans-Klepetko.

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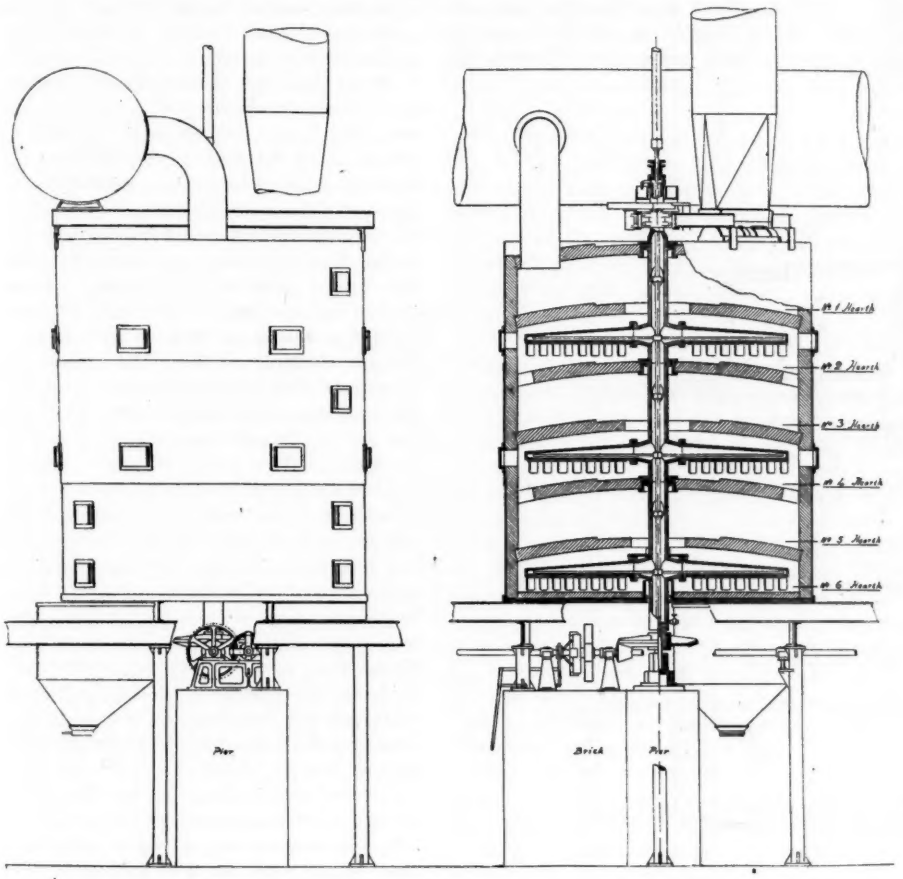
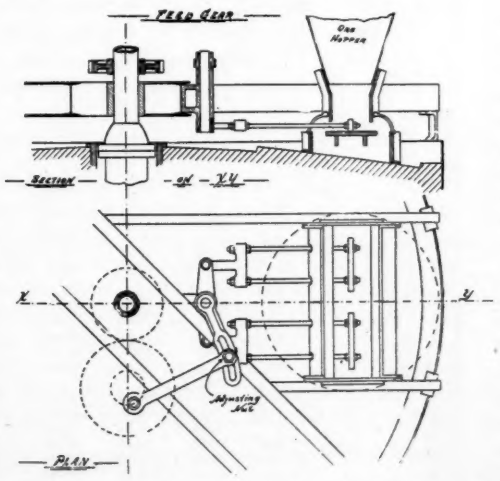
* Abstract from "Notes on the Metallurgy of Copper of Montana," by Professor H. O. Hofman, Institute of Technology, Boston, Mass. A paper presented to the American Institute of Mining Engineers. February, 1903.

*The Original MacDougall Furnace.*[1]—This furnace, patented by MacDougall Brothers in the beginning of the seventies, was in operation in Liverpool, England, burning pyrites to furnish sulphurous gases for the manufacture of sulphuric acid. It had to be abandoned on account of the large amount of flue-dust formed and the many mechanical difficulties encountered. The furnace, 6 ft. in diameter and 12 ft. high, was built of 7 cast-iron cylinders bolted together, and had six closed chambers. The vertical solid shaft, 6 in. in diameter, had cast-iron stirring arms. A 2-h. p. engine was sufficient to drive the mechanism. The furnace roasted in 24 hours 3½ tons pyrite, or 0.020 ton per square foot of hearth area, reducing the sulphur to 2 per cent.




McDOUGALL ROASTING FURNACE.

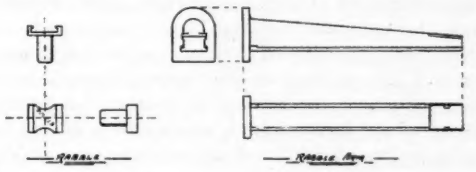
*The Herreshoff Furnace.*—Most of the Herreshoff furnaces in operation at Butte have a ¼-in. steel casing; they are 10 ft. in diameter, and 11 ft. 6 in. in height, and are lined with a full course of red brick. A few furnaces built of two full courses of brick and only hooped with iron bands are doing better work in cold weather than the furnaces that are sheeted and lined with a single course, thus showing that with ores running low in sulphur, when heat has to be husbanded, an 18-in. side wall has its advantages. A furnace has 5 arched brick hearths, 4½ thick and 12 and 13 ins. apart; the pitch of the arch is 4½ ins.; a current of air passes through the hollow central revolving shaft, which is 14 ins. in diameter. The hollow horizontal cast iron stirring arms, two to a hearth, have 7 and 8 teeth, respectively; they are easily exchanged when worn out.




The top hearth acts as a dryer; the second starts the roasting; on the third the ore roasts freely (innumerable sparks are seen); on the fourth there are no sparks; and on the fifth floor the ore looks dark. A furnace, with its shaft making 50 revolutions per hour, roasts in 24 hours 5 to 6 tons of wet concentrates with about 35 per cent of sulphur, or 0.015 tons per square foot of hearth area, reducing the sulphur to 6 per cent. Seventy furnaces make 4 to 5 tons, or 6.4 per cent of flue dust.

In eastern sulphuric acid plants, this furnace[2] treats in 24 hours 3 to 4 tons of pyrites, with 44 per cent of sulphur, or 0.0098 tons per square feet of hearth area, reducing the sulphur to 2½ to 3½ per cent; the shaft makes 30 revolutions per hour.

*The Evans-Klepetko Furnace.*[3]—Shortly after the Herreshoff furnace had proved a success, a larger furnace,[4] 16 ft. in diameter, was constructed on the same general lines; it had 8 hearths, an air cooled shaft and 8 solid cast-iron arms. The heat generated was sufficient to cause the arms to bend under their own weight. Air-cooling having proved unsatisfactory, water-cooling was substituted, and the number of hearths reduced from 8 to 6. The leading differences, then, between the Evans-Klepetko and the Herreshoff furnaces are the size and the water-cooling of the central shaft and the stirring arms. The furnace is 18 ft. 3½ ins. high and 15 ft. 10 ins. in diameter. It is sheathed with ⅜-in. boiler iron, and lined with a full course of red brick; it has six arched hearths with a 9-in. spring and 3 ft. apart; each hearth has two stirring arms making 60 circuits per hour. The furnace stands on columns 12 ft. high, to allow the roasted ore to be collected in hoppers and discharged into cars. Six furnaces form a battery; they are placed from center to center 18 ft. apart in one direction and 21 ft. 3 ins. in the other. Each furnace has two gas-flues, 2 ft. in diameter and 12 ft. apart, passing out of the roof; the flues from three furnaces lead into one main 6 ft. in diameter, having openings along the top and bottom for removing the flue dust; the bottom openings have vertical pipes which are connected directly with the calcine hoppers. The central shaft of a furnace is driven from below. Three furnaces receive their motive power from one main shaft, with which they are connected by friction clutches. A clutch can be thrown in or out from each of the six platforms surrounding a furnace. The cooling water is forced down to near the bottom of the revolving hollow shaft (9-in. inner diameter) through a 3-in. pipe and out to the ends of the horizontal stirring arms through 1-in. horizontal pipes. In its upward passage between shaft and pipe it takes up the return water from the stirring arms and discharges at the top through two spouts into a stationary launder. Shaft and arms are made up of flanged sections to permit easy exchange. Running the overflow-water at 80° C., 20 gallons of cooling-water per minute are required by a furnace. Forty-eight furnaces are supplied with the necessary draft by a steel stack 200 ft. high and 23 ft. 6



DETAILS OF McDOUGALL ROASTING FURNACE.

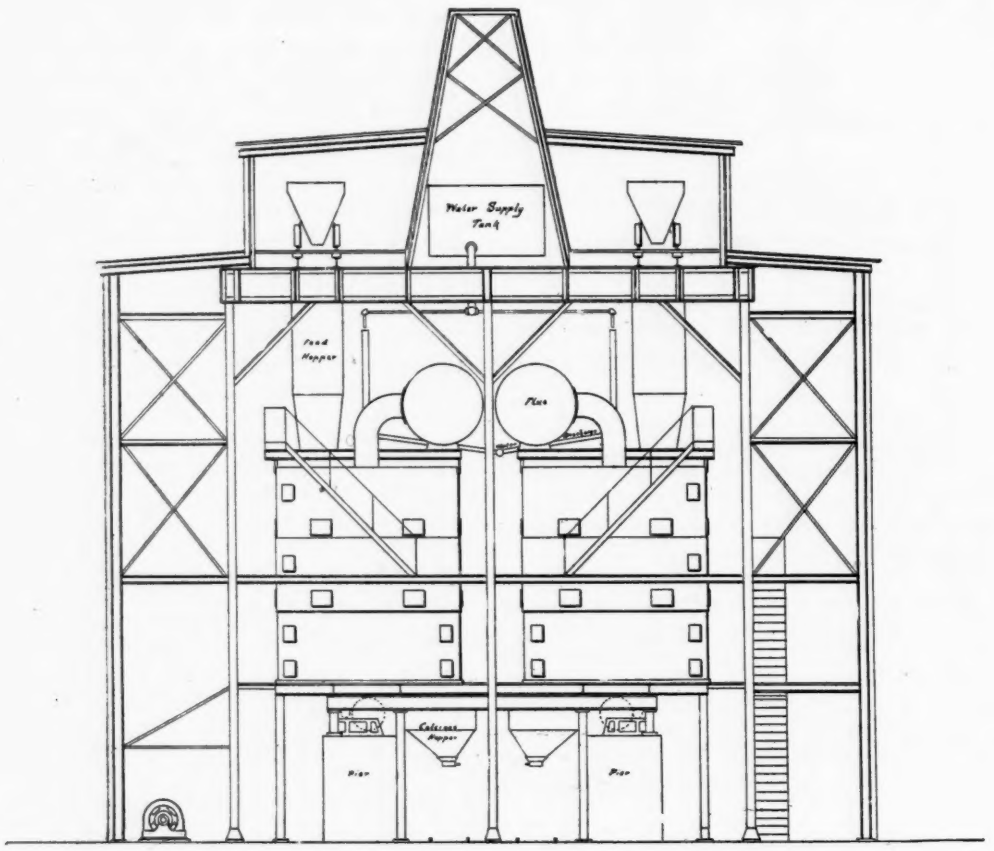
[1] Lunge, "Sulphuric Acid and Alkali," London, 1891, vol. i, pp. 260-264. Also "The Mineral Industry," 1898, vol vi, p. 235.

[2] "The Mineral Industry," vol. vi, pp. 235-238.

[3] U. S. Patent No. 700,399, May 13, 1902.

[4] C. H. Redpath, "The Mechanical Engineer, a Factor in Modern Mining, Milling and Smelting." Mining Congress, Butte, Sept. 3, 1902.

ins. inner diameter, the lower 20 ft. being lined. A 30-h.p. motor is provided to run the machinery. Tests have since shown that 10 h.p. is required for six furnaces. When ore, too low in sulphur to be self-burning—about 28 per cent—is to be roasted, one auxiliary fireplace for two furnaces, placed on the level of the bottom floor and delivering the flame onto the fourth floor, furnishes the additional heat required.




ARRANGEMENT OF BUILDING FOR FURNACES.

The moist concentrates arriving from the ore-dressing plant on an overhead track are dumped into the two feed hoppers of a furnace. These are 10 ft. apart and are 4 ft. 6 ins. in diameter for 9 ft. 6 ins. and then conical for 7 ft. 6 ins. At the bottom they are made 3 ft. 6 ins. by 1 ft. 2 ins. to fit into the openings in the roofs of the furnaces. The top of the hopper has a grating to break up any lumps and to keep out large pieces that may have accidentally gotten into the ore. The hopper holds two cars of concentrates, or 33 tons. This weight, pressing downward, prevents any hanging of the charge and thus solves the difficulty of feeding moist fine concentrates. The contents of the hopper is continuously discharged into the furnace by means of a feeding device of the form of an I, which passes to and fro under the mouth with a throw of about 10 ins. The rods of the two feeders are joined by a cross-piece which is pivoted in the center and connected by a rod to one end of a link, while the other end is attached to the pitman of a crank and spur-wheel; the spur-wheel is geared to the central shaft of the furnace. The ore is spread on the top hearth to the thickness of 3 ins. by the stirring arms. The tops of these arms are protected by cast-iron caps against rapid wear at the places where they strike the ore-column coming down through the feed openings. The outer half of the hearth is 9 ins. thick, the inner 6 ins. The reasons for the difference are, saving of brick, reducing of weight at center, preventing contact with stirring teeth when the hearth rises upon heating, and furnishing an offset to hold the loose working bottom (crushed limestone, sometimes flue dust and even coke dust) which is about 4 ins. thick at the center and 9 ins. at the periphery. The two arms of a hearth have seven and eight cast-iron teeth; these are 8 ins. long by 6 ins. wide by 5/8 in. thick; the lower 3 ins. of the teeth, which come in contact with the ore, are chilled. There is no advantage in making the teeth thicker than 5/8 in., as they wear off obliquely to the working surface and consequently would simply offer a larger wearing surface but not lengthen the life. At the same rate that the teeth are worn off, the ore builds on the loose working hearth. When they are to be renewed, they are removed and a plow is slipped over the stirrer arm and moved a little toward the center after every circuit of the arm. Thus a crust is easily and surely broken up. The crusts on the second hearth are harder to break than those of the other hearths. The teeth on the top hearth last 25 to 34 days; those on the sixth 6 to 8 months. The shorter life of the former is attributed to mechanical wear caused by decrepitation of the ore. It cannot be due to chemical action, as the top hearth serves mainly for drying, unless the moisture should cause some sulphuric acid to form, but the temperature of the escaping gases is 315° C. and the draft is sufficiently strong to show a depression 0.3 in. of water.

Roasting begins on the second and third hearth, varying with the strength of the draught and the number of circuits that the stirring arms make. With a strong draft the heat creeps up; with one circuit in 55 seconds the roast begins on the second hearth, with one in 75 seconds on the third. As the ore passes from the first hearth through the annular opening at the center of the roof of the second hearth (protected by a cast-iron ring), it strikes a distributor which prevents any of it from passing down the shaft. During normal work three doors on the bottom hearth are left open for the admission of air. If the furnace becomes too hot, the doors on the third floor are opened more or less and thus the draught checked. While the ore drops from hearth to hearth, the upward gas-current carries with it dust, and this striking the roof adheres to it in part and builds. In order to protect the arms from being worn out at these places, they are protected by cast-iron caps. When the dust has grown to a thickness of 4 ins. it is removed with chisel-pointed bars. Experiments to protect the roof at weak spots with cast-iron plates has proved successful, as the dust is easily pried off. The chunks of fritted dust go to the blast-furnace as welcome lump ore; they contain only 6 per cent of silica with ore of 30 per cent silica, thus showing that light particles of ferric oxide are more easily carried away by the gas currents than heavy gangue. The dust collected in the settling chambers runs higher in sulphur than the roasted ore.

In starting a furnace, crushed limestone is fed to form the working bottom. Then a small fire of dry, soft, long-flame wood is started from the three side doors of the third and fifth hearths. A new furnace is brought to a dark-red in 3 to 4 days, an old furnace requires only two days. Now, concentrates are fed. After charging for 5 to 6 hours, it sometimes happens that the furnace cools down too much, and this makes it necessary to start on the third and fifth floors a new fire for 1.5 to 2 hours; occasionally feeding of the ore is stopped and half a ton of coal is charged. When this has come to the third hearth, the machinery is stopped and the coal is allowed to burn out. The kindling of the coal may have to be assisted by placing dry wood on the hearth. Under normal conditions a furnace does its best work when the flue shows a depression in water of 0.3 in.; if it is less, the furnace gets cool. The normal ore mixture passes through the furnace in about 1.5 hours. If the furnace gets too hot, more slimes are fed; if too cold, coarser concentrates are charged and the rate of feeding is reduced. As indicated above, the temperature is further regulated by the admission of air; closing the bottom doors drives up the heat, opening them draws it down; opening doors higher up checks the draft. The rate of feed when once settled upon is usually not

*Table I.—Analyses of Ores.*

| Plant. | A. | | | | | | B. | C. | | D. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | First-class ores. | First-class ores. | Fine Concentrates. | Coarse Concentrates. | Fine Concentrates. | Slimes. | Average. | First-class Ores. | Second-class Ores. | Concentrates. | First-class Ores. | Concentrates. |
| Cu ..... | 8.60 | 8.05 | 13.45 | 15.85 | 9.50 | 4.80 | 7.00 | 12.7 | 5.2 | 8.7 | 9.10 | 10 |
| Fe ..... | 18.25 | 12.10 | 25.90 | 21.95 | 22.00 | 5.10 | 24.00 | 18.4 | 16.0 | 27.0 | 16.20 | 30 |
| Zn ..... | 0.55 | .... | trace | 0.50 | trace | trace | 12.00 | .... | .... | .... | .... | .... |
| S ..... | 23.50 | 15.37 | 34.70 | 29.10 | 28.46 | 7.40 | 32.00 | 24.8 | 19.8 | 34.7 | 20.25 | 34-39 |
| Mn ..... | .... | trace | trace | trace | trace | trace | .... | .... | .... | .... | .... | .... |
| As ..... | 0.70 | 1.26 | 0.40 | 0.95 | 0.90 | 0.10 | .... | .... | .... | .... | .... | .... |
| Sb..... | | | | | | | | | | | | |
| Pb ..... | trace | trace | trace | trace | trace | trace | .... | .... | .... | .... | .... | .... |
| $Al_2O_3$ ..... | 6.15 | 10.60 | 5.70 | 3.00 | 7.60 | 20.70 | .... | 4+ | .... | .... | .... | .... |
| CaO ..... | 0.30 | 0.54 | 0.60 | 0.45 | 0.00 | trace | .... | .... | .... | .... | .... | .... |
| MgO ..... | trace | trace | trace | trace | trace | trace | .... | .... | .... | .... | .... | .... |
| Insol ..... | 47.20 | 56.50 | 21.60 | 30.30 | 35.90 | 76.50 | 23.00 | 40.0 | 56.0 | 25.4 | 45.50 | 22.24 |
| $SiO_2$ ..... | 39.30 | 49.70 | 18.15 | 26.50 | 29.50 | 53.45 | .... | .... | .... | .... | .... | .... |
| $H_2O$ ..... | .... | .... | 4.7 | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Ag. oz. p. t... | 3.00 | 3.90 | .... | 5.00 | 4.00 | 2.80 | 14.00 | 7.6 | 3.0 | 5.6 | .... | .... |
| Au. oz. p. t... | 0.016 | 0.010 | .... | 0.02 | .... | .... | .... | 0.032 | none | 0.0025 | .... | .... |

(The above table represents only a portion of the data given by Prof. Hofman. Four different smelting establishments. A, B, C and D, contribute the analyses which are here quoted.)

altered, and the number of circuits the arms make per hour remains, of course, constant.

The dust, which collects in the flue connecting three furnaces and forms 4 to 5 per cent on the ore, is raked out every day, sometimes part of it is blown into the main flue of a battery, with a hose under a pressure of about 90 lb. per square inch. The loss of weight in ore, including flue dust, is about 20 per cent.

A furnace treats, under normal conditions in 24 hours, 40 tons sulphide ore, with 35 per cent sulphur and 10 per cent copper, or 0.042 tons per square foot of hearth area, reducing the sulphur to 7 per cent; roasted ore, with 14 per cent copper treated in the same manner, retains about 10 per cent of sulphur. The product can, of course, be varied with the speed of travel of the stirring arms: Thus, with one circuit in 75 seconds, it is reduced to 30 tons, with one in 50 seconds it is increased to 50 to 55 tons.

A section of six furnaces is tended to in an 8-hour shift by one-third foreman, one furnace man, one helper, one-sixth oiler, one-ninth repairman and one trimmer.

The following partial average analysis of roasted ore represents two determinations from the average day and night samples, taken during an experimental run of 15 days: $SiO_2$, 26.9 per cent; Cu, 18.3 per cent, of which 9.9 was present as CuO; Fe, 30.0 per cent, of which 17.9 was present as FeO; S, 9.2 per cent, of which 0.81 was present as $SO_3$.

The matte formed in crucible fusions contained 65 per cent copper. In comparing the roasted ore of the MacDougall furnace with that of the Bruckner furnaces of the same plant, it is found that it is reddish-brown as against a dark brown (more $Fe_2O_3$ is formed), more porous (1 cu. ft. weighs 87 lb. as against 100 lb.) and finer (the rolling of the ore in the Bruckner cylinder causes particles to form pellets). In regard to flue dust, the MacDougall furnace makes much less than the Bruckner cylinder, although the amount is still great; they compare as 1:3 to 4.

*General Results.*—Some of the leading facts of the roasting furnaces operated in Montana are brought together in the subjoined table:

*Table II.—Details of Montana Roasting Plants.*

| | Tons roasted 24 hrs. | Horse-power. | Sulphur in concentrates. | Sulphur in calcines. | Area of hearths. | Concentrates per sq. ft. hearth. | Coal per ton concentrates. | Cost per ton. |
|---|---|---|---|---|---|---|---|---|
| | | | % | % | Sq. ft. | Lbs. | Lbs. | |
| Hand-reverberatory furnace, 69½ ft. x 16 ft. hearth | 13 | ... | 35 | 7-8 | 1,112 | 12 | 307 | $2.00 |
| Allen-O'Hara furnace, two hearths, 94 ft. x 9 ft. | 51 | 3.64 | 35 | 8 | 1,692 | 77 | 145 | 0.78 |
| Bruckner cylinder, 8 ft. x 16 ft. | 18.20 | 1½ | 37 | 9-5 | .... | .. | 540 | 1.25 |
| Pearce single-deck furnace | 14‡ | 1½ | 32 | 7-8 | 505 | 55 | 400 | 0.98† |
| Pearce double-deck furnace, 6-ft. hearths | 30‡ | 3 | 35 | 6-7 | 1,010 | 59 | 400 | 0.98† |
| Pearce double-deck furnace, 7-ft. hearths | 42‡ | 3 | 35 | 6-7 | 1,218 | 69 | 182 | 0.98† |
| Keller-Gaylord-Cole furnace, two sets of six hearths | 50 | 1¾ | 38 | 7-10 | 2,592 | 38 | 67 | .... |
| Wethey furnace, two sets of four hearths, 50 ft. x 5 ft. | 60 | 4 | 40 | 8 | 2,000 | 60 | 100 | .... |
| Wethey furnace, two sets of four hearths, 65 ft. x 10 ft. | 90 | 4 | 35 | 5.6 | 2,600 | 70 | 80 | .... |
| Herreshoff furnace, five hearths | 5-6 | ... | 35 | 6 | 135 | 80 | ... | 0.50 |
| MacDougall-Evans-Klepetko furnace, six hearths | 40 | 1⅜ | 35 | 7 | 952 | 84 | ... | .35 |
| Pearce multiple-hearth furnace, six hearths | 56‡ | 12 | 35 | 6-7 | 2,947 | 38 | 28.5 | 0.98† |

Data obtained from operations of six months at Great Falls. For quality of coal see analysis of Sand Coulee and Belt coal elsewhere in this paper.

† Average.

‡ These low figures are due to the character of the ore (Gagnon mine) which carries 8-12 per cent zinc.

ELECTRIC POWER AT THE BRITISH STEEL WORKS.—According to the London *Colliery Guardian*, the Tredegar Company, in Wales, has installed a Westinghouse electric plant for the purpose of generating power for the works. The steam is furnished by two blocks of Babock & Wilcox boilers with forced draft. As the company itself mines coal and makes coke, it is able to utilize in these boilers coke breeze and slack coal which have hitherto gone to the waste dumps. Mr. L. D. Whitehead, manager of the works, claims that electricity is generated at this plant at a cost of 0.375c. per unit, and he hopes to make a still further reduction.

[5]Size: 8 by 16 ft., 1 revolution in 7 minutes; 15-ton charge in 24 hours; drying, 2 hours; burning, 4 hours; charging, roasting and discharging, 18 hours.

## OBSERVATIONS ON MOTHER LODE GOLD DEPOSITS, CALIFORNIA.*

By W. R. PRICHARD.†

*General Geology.*—The mineral belt known as the "Mother Lode"[1] may be described as a series of connected lode-fissures lying within a belt of country of variable width and over a hundred miles in length, traversing Amador, Calaveras and Toulumne Counties, California.

The valuable portions of the lodes within this belt are not confined to any particular fissure for more than a few hundred feet. The ore-bodies branch from one parallel fissure to another at frequent intervals, only keeping somewhere near the general direction of the belt. The connecting branches and spurs are often more valuable than the principal lodes.

The lode-fissures occur in all rocks of the zone; but their structure is modified by cleavage and other physical peculiarities of their environment.

The distribution of gold in the lodes appears to be dependent, firstly, upon the precipitating properties of certain rocks; and secondly, upon certain physical and structural peculiarities in the fissure itself and in the walls of the fissure.

After a study of the excellent geological reports and maps prepared by the United States Geological Survey[2], and after practical experience in working the ore deposits in this field, it is concluded that the local bedrock complex records three important epochs of structural disturbance directly connected with the gold deposits:

First—A period of uplift and intrusion of the rocks now constituting the Sierra Nevada;

Second—Later dioritic intrusions of smaller magnitude, resulting directly in the formation of fissures and mineral deposits;

Third—A period of cooling and contraction, resulting in faulting and crushing of these deposits.

The upheaval of the Sierra Nevada resulted in great folding of the overlying rocks. Sedimentary beds and eruptives were thrust westward into nearly perpendicular folds. The folding was followed by faulting, which caused an exceeding complexity of the rock structure. The rocks appear on the map as interlocked strips of diverse composition and lenticular in shape. Only individual portions of the complex are conformable. The general lenticular outline has been cited as both the result and proof of the intrusive origin of some portions of the various distinguishable rock series. This is true, however, only in the case of a few eruptives of a period much more recent than that now referred to. Owing to the great pressure, and the heat accompanying the intrusion of so large a mass, the existence of open fissures and the deposition of quartz from solutions was therefore impossible, except near the surface, now eroded away. The overlying rocks were simply metamorphosed, given a schistose structure, and impregnated with silica.

The next event in the geological record was the intrusion of the diorites, now altered to "metadiorites,"[3] which underlie a large part, if not the whole, of the Mother Lode region. These rocks now constitute a broken belt of irregular area along the east side of the lode series. The diorite intrusions were small as compared to the other, and followed the general line of weakness of the planes of schistosity formed by the older disturbances. It is not a new idea to connect these eruptives with the mineral deposits in this district,[4] and similarly situated eruptives have been noted in many mining fields of the world.[5]

*Circulating Solutions.*—The intrusions of the "metadiorites," though powerful enough to rend the overlying rocks, was not accompanied by heat and pressure sufficient to obliterate, in the region of our present surface, the fissures then formed. These fissures served as an outlet for the highly siliceous solutions ejected by pressure from the deep zone.

These solutions, in their upward progress, along fissures, passed through rocks less heated and more rigid, so that the fissures in their approach to the surface were more open and the exit for the solutions more free. Their excess of mineral was deposited on the walls until the fissures were closed by the precipitate, so as to interrupt the flow of waters. After this closing, conditions became favorable for the deposition of crystals of quartz and minerals contained in small amounts in solution. This accounts for the occurrence, so common in large quartz veins, of "vugs," or crystal cavities. These vugs are but the remnants of large cavities.

The writer has seen a number of crystal cavities in the stopes of the Keystone Mine. These vugs were found within large bodies of white "buck" quartz of very low gold value. When broken into, the cavities were filled with a solution containing a large proportion of semi-fluid hydrous mica (margaradite). Unfortunately the solution in every case escaped, and a sample for analysis could not be obtained. From a single one of these cavities the writer obtained some beautiful specimens of quartz, pyrite, zinc-blende, galena, gold and silver alloy, and calcite, all crystallized. The general order of crystallization in this case was quite apparent. The large quartz crystals were pretty well complete before the other minerals started to form; but the quartz had continued to grow, enveloping some of the other minerals. Entirely enclosed in a large transparent quartz crystal was a particle of gold, weighing perhaps several grains. After quartz, iron pyrite was the next mineral to grow; but it had not developed completely before galena and gold crystals started to grow, and then zinc-blende, calcite and margaradite respectively. Gold and galena crystals are embedded in the pyrite, but they appear to have begun to form toward the end of the precipitation of pyrite. All of the minerals appear to have shown a greater preference for their own kind. Gold, pyrite, galena and zinc-blende preferred forming on each other rather than on quartz; but calcite showed a distinct preference for quartz.

*Economic Importance of Pyrite.*—Pyrite does not appear to have been the precipitating agent for gold.

*Abstract from *Transactions* American Institute of Mining Engineers. February, 1903.

†Now at Kalgoorlie, Western Australia.

[1]Prof. J. F. Kemp ("The Ore Deposits of United States and Canada," pp. 361-375) gives a very full bibliography of the literature of California ore deposits.

[2]"Mother Lode District, California," Folio No. 63.

[3]"Metadiorites" are altered diorites, largely quartz-diorites.

[4]"Relation Between Ore Deposits and Their Inclusive Walls," H. W. Fairbanks, ENGINEERING AND MINING JOURNAL, March 4, 1903.
W. Lindgren, *Seventeenth Annual Report*, United States Geological Survey, II., 168.

[5]"A Treatise on Ore Deposits," Phillips & Henry Louis, pp. 213-214: "Copper and tin ores of Cornwall, in Parish of St. Agnes, and in the western portion of Perranzabulor were most frequently met with in the vicinity of elvans (quartz porphyries)."
"The Mineral Resources of New South Wales," by Edward F. Pittman, pp. 56-57: "It seems possible that this enrichment of the ore bodies is due to the intrusion of the igneous dikes, for all of the payable deposits hitherto worked have been in the immediate neighborhood of these intrusions."

It does appear, however, to have facilitated such action. As described above, the gold in the vug chose to precipitate on pyrite in preference to quartz. This appears to be characteristic. The same causes that precipitated the gold appear to have precipitated the pyrite and various other minerals. Pyrite appears to have acted as a connecting link between the gold in solution and the carbon in the slate.

Vug deposits are of but little economic importance, owing to the large amount of barren quartz necessarily deposited before the solution was sufficiently concentrated to induce precipitation of the gold. For the deposition of ore-bodies of economic value, it was important that the excess of silica should not be too great, and that a direct contact of the gold-bearing solution should take place with a precipitating agent.

Where silica occurred in large excess, the excess was eliminated by precipitation in open cavities and in the cavities of crushed wall-rocks. These openings varied in size from microscopic veinlets to great chambers. An excess of silica in a solution interfered with gold precipitation by coating the walls of the fissures with quartz. Contact between gold, in the solution, and the walls was thus prevented. The structural peculiarities of the ore-bodies in the district clearly point to the conclusion that such a contact was ordinarily necessary. It usually occurred, in the ore-making process, that, after a large amount of silica had been eliminated by precipitation in cavities, subsequent movements crushed and tore apart the walls and their previously deposited inclusions. Fresh cavities were thus formed, into which the remaining gold solutions were squeezed and brought into contact with rocks possessing precipitating properties. Such movements account for the crushed, banded and jointed structures so common in lode deposits. The narrower openings, if situated so that much gold solution passed through them, received with each filling a large percentage of gold per unit of space, and a smaller percentage of silica, than the larger openings. When this process was repeated by successive openings, rich ore-bodies were formed where the favorably situated small openings occurred; and where the openings were larger, bigger quartz bodies were built up, in which the seams of gold were frequently too widely separated by quartz to give economic importance to the deposit.

It may be concluded from this that the portion of the fissure that opened by small increments was more favorably situated for enrichment than that part opened by large increments.

Rich ore-bodies of great width are found whose seamy structure shows that they were built up by small periodical increments next to one or both of the walls. The parts of fissure structure most likely to cause small increments of opening are those which are not in the plane of sliding or tangential movement of the walls. In this district the cleavage planes of the slate and schist are nearly vertical, while the fissures generally dip east. Many of the latter have kept their general direction by a zig-zag course, alternate portions following the cleavage planes. In the portion of a fissure where an upward movement of the hanging wall took place, a sliding contact resulted along the smooth cleavage planes; but in the part of the fissure which lies across the cleavage planes the walls have been simply pulled apart. The writer has observed in a number of mines that the richest ore-bodies on the Mother Lode lie across the cleavage, in those portions of the fissure which have been thus pulled apart.

*Precipitation of Gold by Carbon-Bearing Slates.*—It is evident that a lesser degree of concentration of solution was required for the precipitation of gold when solutions were in direct contact with certain wall-rocks. Evidence strongly favors the conclusion of a sedimentary origin of at least a large portion of the "greenstones" in the region, and there is no doubt about the sedimentary origin of the black clay-slates. Any precipitating properties of these rocks on gold may therefore, in view of all that has been written on the subject, be attributed to organic matter in them.[6] A great many of the greenstones are interbedded with shales; crosscuts show a banded structure. The thicker bands of greenstone are green and coarsely crystalline, but the thinner bands vary in texture and color.

Lodes crossing rocks of this banded structure show striking variations in value, corresponding to the amount of organic matter in the rocks, as indicated by the color—the blackest color denoting the most carbon. The writer has noticed a corresponding variation in the reducing power of these different wall-rocks on litharge in assaying. Sulphur contents being uniform, an assayer may be guided by the color of the rock in reckoning the amount of reducing agent required in assaying samples of these rocks.

The total absence, or small amount, of organic matter in these bedded greenstones, and a frequent conglomerate or brecciated structure, argue that they were deposited with a rapidity which precluded the existence of organisms. The conclusion that most of these greenstones are of sedimentary origin is not contradictory to the opinion that in this region they are largely derived from tuffs and eruptive detritus. Some of them may represent lava flows on the sea bottom during sedimentation.

The most valuable ore-bodies in this region owe their enrichment to the presence of the black carbon-bearing slates. Yet even in these slates only a few portions of the lodes are valuable, for the reason that after the fissure was opened the slate walls became coated with silica before the solution contained sufficient gold to make a precipitate of economic importance.

When a movement of the walls crushed the quartz lining and permitted a solution containing an accumulation of gold to escape from the fissure into or along a slate wall, the gold and pyrite were precipitated immediately upon the slate. When such a solution escaped into fractured greenstone schist, it diffused its gold throughout a greater mass of material before precipitation was effected. The gold, as well as the pyrite, decreases in amount as the distance from the main fissure increases.[7]

This variation in the precipitating properties of the different types of wall-rocks accounts for the occurrence of ore in pockets, and in comparatively small rich deposits in the black slates, and for the wide dissemination of values in the greenstones. Nature provided the black slate as a concentrator.

*Structural Peculiarities.*—Following upon the dioritic intrusions and the formation of the existing mineral lodes, came a period of cooling and contraction. The more rigid rocks contracted almost without rupture. Their contraction was adjusted by movements along previously formed fissure planes, and by distortion and settling of the soft, weak, clay-slates. These movements crushed and faulted many of the lodes and permitted the soft Mariposa slates to settle down vertically in folds between the walls formed by the more rigid slates and greenstones. This settling of the slates detached and carried downward large portions of payable lodes and also formed many recent fissures that are only marked by great sheets of black mud or crushed slate (gouge), mixed with fragments of quartz lodes. Such fissures are very misleading in working out vein structure. They are, however, often of considerable economic importance on account of their mineral contents, consisting of large segments of quartz veins, quartz boulders, and finely crushed or "sugar" quartz.

A good understanding of these recent fissures is important, in order to save much costly development on pseudo-lodes. Extravagant litigation might have been avoided in the district in more than one case by an understanding of the difference between lodes and fault-planes. Law-suits have been instituted by parties owning the outcrop of a fissure that has been formed ages since the deposition of a certain ore-body, to which it could be traced by a trail of crushed slate.

The ore deposits of the Mother Lode exhibit certain structural peculiarities which have an important bearing on the distribution of the gold. The mines on this mineral belt, historical for their production, are those in which a rich ore-body outcropped on the surface. Any miner could follow one of these pay-shoots down to any depth, so long as it continued rich. Other rich deposits, however, occur that are to be found only by a mastery of the structural geology. In such cases ordinary prospecting methods are inconclusive. Particularly is this true of the class of deposits where the principal enrichment is wholly within the walls, unattached to the quartz vein, which, at that particular point, may or may not carry values. Such detachments were caused by recent movement of the walls, resulting in the formation of great sheets of crushed material called "casing" or "gouge."

Mother Lode mines are commonly associated with a broad belt of black carbon-bearing clay slate, termed the "Mariposa Formation" by the United States Geological Survey. There are two reasons for this association:

1. The soft slates offered less resistance to fracture than any other rock formation in the region, hence more fissures reached the surface in this belt. Flat dipping fissures in other rocks were deflected upward by the easily opened vertical lamination of the slates.

2. The organic contents as well as the physical structure of the slates generally favored precipitation of gold, hence a large part of the lodes occurring in this slate formation are of economic value.

As stated at the beginning, the lodes or veins constituting the Mother Lode occur in all materials of the mineral zone, and it is important to be able to determine which portion of such a lode, or what lode (where there are many) is most likely to be sufficiently enriched for profitable extraction. With this object in view, a few of the types of ore-bodies are herewith described.

*Regular Veins.*—Well-defined straight fissures are generally filled with large, regular, clear quartz bodies, or brecciated mixtures of quartz and wall-rock. The latter come under the head of crushed zones. Gold in clear quartz occurs only in occasional patches or seams. This peculiarity is accounted for by the regularity of the walls having caused all movements to affect the whole fissure alike, thus minimizing the possibilities for the isolation of solution, or for the fracturing of walls, and contact of solutions with naked walls. Every disturbance of the walls caused a free outlet for solutions from depth; thus great quantities were brought into the fissure. Deposits in these fissures contain more crystal cavities than any other deposits in the region.

*Irregular Veins.*—The most valuable veins of the Mother Lode are those occupying fissures whose course through the rocks is zig-zag or winding. Every movement of the walls necessarily caused an opening of certain portions of the fissure, and a crushing of certain portions of the walls. This, as described previously, favored intimate contact between solution and country rock, resulting in enrichment of certain portions of the vein, and impoverishment of other portions. The rich, banded ore or "ribbon rock" occurs in such fissures. Its structure is due to the opening of the fissure intermittently, and the building up of the ore-body by small increments.

In hard rock, a slight turn in the fissure was sufficient to cause these openings and crushings; but in flexible schists greater irregularities were necessary to produce the same results.

*Crushed Zones.*—Zones of crushed country rock are the result of the movement of the walls of an

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[6] T. A. Rickard, *Transactions* American Institute of Mining Engineers, XXII, pp. 314-315; XXVI, pp. 977-979, and ENGINEERING AND MINING JOURNAL, 1895, pp. 561-562.
C. R. Van Hise, *Transactions* American Institute of Mining Engineers, XXX, pp. 94-95 and 118-120.
J. R. Don, *Transactions* American Institute of Mining Engineers, p. 569.
E. E. Lungwitz, ENGINEERING AND MINING JOURNAL, April 28, 1900, p. 500.

[7] W. Lindgren, *Seventeenth Annual Report*, United States Geological Survey, II, pp. 124-125 and 146.

irregular fissure whose projecting irregularities were crushed into a brecciated mass and drawn into the fissure, or of the fissuring of a schistose or cleavable formation too yielding to be able to fracture with a clean break.

To the latter class belongs the so-called "mineralized country rock" or "gray ore." Thin sections of gray ore from the Keystone Mine, prepared and examined by Mr. T. J. Hoover,[8] showed a minute vein structure, with crystallized gold and pyrite in the quartz. The structure in a thin section appears similar to the structure as it appears on a larger scale in a hand specimen. The country rock is fragmentary, and but very little altered by metasomatism, if at all.[9] The gray color may be due to the presence of extremely minute quartz veins. These deposits are of great size in the Utica, Zeila, Mahoney, Keystone and many other important mines in the district. The gold in them is much more uniformly distributed than in the black slate deposits, and the value is much lower, except in rich leaders of quartz.

The deposition of gold in crushed zones may be accounted for by concentration of solution. Great widths of schists have been crushed, and the space filled with quartz; but only comparatively small portions have received sufficient gold for profitable mining. The gold in these portions lies principally in leaders or stringers of quartz.

The first crushing permitted a flow of siliceous solution and the deposit of quartz in the minutest cracks of the schist. As these veinlets were closed by the deposition of quartz, the gold, not yet being sufficiently concentrated for deposition, remained in solution and retreated into the larger openings. With each successive crushing of the schists, they became more siliceous and harder, and the crushing extended farther into the softer walls. With every crushing and filling the gold solution became more concentrated, until the gold was finally deposited with the quartz. These deposits filled the cracks of the silicified crushed zone, thus forming rich leaders in a quartzose schist—a form of deposit found in many parts of the world. By the process just described, a great width of country rock was crushed and silicified; but the deposition of gold in economic quantities was confined to comparatively small portions, throughout which, however, the small gold-bearing leaders are pretty uniformly distributed.

The crushed greenstone deposits from the Utica and Zeila mines owe their value no doubt to the small amount of silica in their gold-bearing solutions, while the rich quartz deposits of the Gwin, Kennedy, Argonaut, Central Eureka, South Spring Hill, Keystone, Bunker Hill, and such mines, owe their value to the segregating effect on highly siliceous solutions of certain local variations in the structure and composition of their wall rocks.

## PRODUCTION OF BLUE VITRIOL DIRECTLY FROM ORES.

At the meeting of the International Congress for Applied Chemistry at Berlin June 2-8, 1903, G. Gin, of Paris, described a new method for the production of blue vitriol directly from sulphide ores. The ore is roasted and then is leached with dilute sulphurous acid, obtained from the roasting process. In this way a solution of copper sulphide and $Fe_2SO_5$ are obtained which quickly alter according to the following reactions:

$$3\ CuSO_3 + CuO = Cu_2\ SO_3\ CuSO_3 + CuSO_4$$
$$Fe_2SO_5 + SO_2 = FeSO_4 + FeSO_3.$$

By heating the solution sulphur dioxide is driven off and copper sulphate is formed, while a portion of the copper is precipitated as metal, the reaction being expressed as follows:

$$Cu_2SO_3 + CuSO_3 = 2\ Cu + CuSO_4 + SO_2.$$

At 180° C. the sulphite and sulphate of iron are completely insoluble; the copper sulphate remaining in the solution can, therefore, be separated by filter pressing, the press being kept hot by steam. The metallic copper is separated by leaching the precipitate at ordinary temperature. In this way one-half of the copper is recovered in metallic form and the other half is got as sulphate by crystallization of the purified liquor.

[8] T. J. Hoover assisted the writer in tracing out the structural peculiarities of the Keystone and other Mother Lode mines.

[9] Lindgren, *Seventeenth Annual Report*, United States Geological Survey, Part II, pp. 124-125 and 146.
Van Hise, *Transactions* American Institute of Mining Engineers, XXX, p. 159.

## CANADIAN IRON BOUNTIES.

The text of the proposition made by the Finance Minister to the Dominion Parliament with regard to bounties on iron and steel made in Canada is as follows:

The Governor-in-Council may authorize payment of the following bounties on the undermentioned articles manufactured in Canada from steel produced in Canada, from ingredients of which not less than 50 per cent of the weight thereof consists of pig iron made in Canada:

On rolled, round wire rods, not over ⅜ in. in diameter, when sold to the wire manufacturers for use in making wire in their own factories in Canada, a bounty of $6 per ton.

On rolled angles, tees, channels, beams, joists, girders or bridge building or structural rolled sections, and on other rolled shapes not round, oval, square or flat, weighing not less than 35 lbs. per lineal yard, and also on flat eye-bar blanks, when sold for consumption in Canada, a bounty of $3 per ton.

On rolled plates not less than 30 ins. in width and not less than ¼ in. in thickness, when sold for consumption in Canada for manufacturing purposes for which such plates are usually required, and not to include plates to be sheared into plates of less width, a bounty of $3 per ton.

The Governor-in-Council may make regulations to carry out the intentions of the foregoing section.

That Chapter 8 of the Statutes of 1899 be so amended as to provide that the bounties on steel and iron authorized by Chapter 6 of the Statutes of 1897 shall be continued until June 30, 1907, and that the rates of such bounties shall be as follows:

From July 1, 1903, to June 30, 1904, both inclusive, the bounties shall be 90 per cent of the amount fixed by the said Chapter 6 of the Statutes of 1897.

From July 1, 1904, to June 30, 1905, both inclusive, the bounties shall be 75 per cent of the amount fixed by the said chapter.

From July 1, 1905, to June 30, 1906, both inclusive, the bounties shall be 55 per cent of the amount fixed by the said chapter.

From July 1, 1906, to June 30, 1907, both inclusive, the bounties shall be 35 per cent of the amount fixed by the said chapter.

The Government decided not to treat the Newfoundland ore as a domestic ore in regard to the duties payable, although the Dominion Iron & Steel Company made an application to that effect.

## THE COMMERCIAL MUSEUM OF THE PHILIPPINES.

The Commercial Museum of the Philippines is a branch of the Museum of Ethnology, Natural History and Commerce established by the Philippine Commission less than two years ago. The museum is under the general direction of the Bureau of Non-Christian Tribes and is in immediate charge of Mr. Samuel B. Shiley as superintendent. The object of the museum is to encourage the intelligent and profitable development of the resources of the Philippines and to aid in the extension of domestic and foreign trade relations. It intends to make the fullest possible collection of data bearing on the resources and commercial opportunities of the islands.

The museum is well located in Manila and the bureau invites the intention of manufacturers and shippers in the United States to the opportunity extended to them to exhibit, free of charge, such products as are suitable for the markets of the islands. Firms which desire to form business relations in our Eastern possession should send addresses, list of articles handled, terms of sale, time, discount, etc., whether they intend to place exhibits in the museum or not. This information will be carefully classified and preserved in such a form as to be readily accessible to the business public.

While there is at present only a comparatively small demand for mining machinery in the Philippines, there is no doubt that in due course of time a considerable mining industry will be developed in the islands. We have heretofore referred to the existence of important deposits of coal, iron ore, copper ore and other minerals. The list might also be extended to include gold, which has already been found in several localities, and possibly tin, the existence of which, while it has not yet been proved, is considered extremely probable.

We may mention, incidentally, that among importers in Manila there has been much complaint against American shippers, on account of insecure or improper packing of ocean freights. Shippers should also understand that the bills of lading should be clear and give full details, and that they should be sent always in duplicate.

The conditions of exhibit as prescribed by the bureau are as follows:

"Foreign manufacturers and exporters, and local producers, manufacturers, exporters and importers may place exhibits in the museum free of charge. However, in some instances where the exhibits require special care and protection, it may be desirable that the exhibitor furnish a suitable case.

"In case of heavy articles, or intricate machinery, the exhibitor will be required to place them in the museum. Articles for exhibition sent by rail or water transportation to Manila will be looked after by the museum. However, all freight to Manila must be repaid, unless otherwise arranged for with the museum. There are no customs dues on articles addressed to the Commercial Museum.

"Every article on exhibition will be marked with its name, name of manufacturer and exhibitor, use, price, etc.

"In case of valuable or perishable articles, the exhibitor may retain the right of property in the articles exhibited, and may change or discontinue his exhibit whenever he feels so disposed; except that he may not demand an article while it is on any special exhibit or when it is wanted for such an exhibit.

"The Commercial Museum is maintained by the Civil Government and its services are rendered without charge to its patrons.

"Address all communications and articles for exhibition to Samuel B. Shiley, Commercial Museum, Manila, P. I."

THE GERMAN TUBE SYNDICATE.—German papers say that various reports are in circulation respecting the syndicate of makers of gas and boiler tubes, whose existence under the present agreement is on the point of expiration. On the one hand, the combination is said to have been extended for six months, and on the other, that a decision has not been arrived at owing to the withholding of the consent of a large company, which desires an increase in the amount of the production which has hitherto been allotted to it.

MINERAL IMPORTS AND EXPORTS OF SPAIN.—The imports of fuel into Spain for the five months ending May 31 were 873,513 metric tons of coal and 81.52 tons of coke. Exports of minerals for the five months are reported by the *Revista Minera* as follows in metric tons:

| | 1902. | 1903. | Changes. |
|---|---|---|---|
| Iron ore ..... | 2,997,229 | 3,286,595 | I. 289,366 |
| Copper ore ..... | 390,138 | 438,980 | I. 48,842 |
| Zinc ore ..... | 28,165 | 57,191 | I. 29,026 |
| Lead ore ..... | 1,378 | 1,277 | D. 101 |
| Pyrites ..... | 211,408 | 242,163 | I. 30,755 |
| Salt ..... | 120,207 | 137,069 | I. 16,862 |

Exports of metal were 22,400 tons pig iron, a decrease of 1,633 tons from last year; 12,787 tons copper, an increase of 2,468 tons; 969 tons spelter, an increase of 70 tons; 62,503 tons lead, a decrease of 4,861 tons.

## EARNINGS OF BUTTE COPPER COMPANIES.

In a recent issue we published, in our news columns, some figures from the returns made by the mining companies of the Butte district to the assessors of Silver Bow county, Montana. As the published figures contained some inaccuracies, we have obtained a full transcript from the assessors' books, showing such information as is contained in these reports. They are made in such general form as to convey very little real information; but we give the figures because they are the only information approaching the nature of a report which is made public by these companies.

The ore tonnages, gross and net earnings, as reported to the assessors, were as follows:

| | Total Tons. | Gross Proceeds. | Net. | Gross per Ton. |
|---|---|---|---|---|
| Colusa-Parrot | 265,113 | ..... | $245,785 | $8.29 |
| Colorado Sm. & Mg. | 235,113 | $998,639 | 43,090 | ..... |
| Speculator | 29,233 | ..... | 106,784 | 15.03 |
| Butte & Boston | 245,333 | ..... | 202,408 | 7.90 |
| Parrot | 253,284 | 2,255,870 | 586,367 | 8.91 |
| Boston & Montana | 907,227 | 12,730,899 | 4,053,467 | 14.03 |
| Anaconda | 1,392,835 | 14,597,852 | 1,601,199 | 10.48 |
| Washoe | 106,588 | 1,113,785 | ..... | 10.45 |
| Mont. Ore Pur. Co. | 293,332 | 3,587,692 | 601,250 | 12.23 |

The expenses, as stated in the returns of the several companies, are given in the following table:

| | Mining. | Transport. | Reduction. | Refining, etc. |
|---|---|---|---|---|
| Colusa-Parrot, total | $981,583 | $60,636 | $911,989 | .... |
| Per ton | 3.70 | 0.229 | 3.44 | .... |
| Colorado Sm. & Mg. | 581,126 | 37,693 | 336,728 | .... |
| Per ton | .... | 0.16 | .... | .... |
| Speculator | .... | .... | .... | .... |
| Per ton | 4.15 | .... | .... | .... |
| Butte & Boston | 801,401 | 39,287 | 524,361 | .... |
| Per ton | 3.27 | 0.16 | 2.44 | .... |
| Parrot | 710,831 | 45,591 | 692,267 | $220,814 |
| Per ton | 2.81 | 0.18 | 2.73 | .... |
| Boston & Montana | 2,368,983 | 907,227 | 2,767,042 | 2,634,180 |
| Per ton | 2.61 | 1.00 | 3.05 | .... |
| Anaconda | 4,862,421 | 208,295 | 4,718,155 | 3,207,152 |
| Per ton | 3.49 | 0.15 | 3.39 | .... |
| Washoe | 404,470 | 15,988 | 328,170 | .... |
| Per ton | 3.79 | 0.15 | 3.08 | .... |
| Mont. Ore Pur. Co. | 1,039,029 | 95,333 | 1,303,565 | 548,514 |
| Per ton | 3.54 | 0.325 | 3.62 | .... |

In addition to the above expenses, the Washoe Company reports $903,139 paid for improvements. The distances from mines to works, over which the ore is transported, are given by the several companies as follows: Colusa Parrot, 2 miles; Boston & Montana, 172 miles; Anaconda, 27 miles; Washoe, 27 miles; Montana Ore Purchasing Company, 1 to 3 miles.

We may add that this statement has little value as a comparison in costs among the different companies. Thus, the Butte & Boston Company only carries its copper product through the converters, while the Boston & Montana includes, under reduction costs, the expense of electrolytic and furnace refining on a large part of its output. The same is true of the Anaconda reduction costs, as the greater part of the copper is treated electrolytically. The Washoe and Parrot ores are treated at the Anaconda Works, as well as the Anaconda ores.

## BOUNTIES ON CANADIAN LEAD.

The following resolution in relation to the payment of bounties on lead has been introduced in the Dominion Parliament:

The Governor-in-Council may authorize the payment of a bounty of 75c. per 100 lbs. on lead contained in lead-bearing ores mined in Canada; such bounty to be paid to the producer or vender of such ores upon evidence that such ores have been smelted in Canada. Provided, that the sum to be paid as such bounty shall not exceed $500,000 in any fiscal year. Provided, also, that when it appears to the satisfaction of the minister charged with the administration of the act that the standard price of pig lead in London, England, exceeds £12 10s. sterling per ton of 2,240 lbs. such bounty shall be reduced proportionately by the amount of such excess.

Payment of the said bounty may be made from time to time to the extent of 60 per cent of the full bounty authorized, subject to the adjustment at the close of each fiscal year. If at the close of any fiscal year it shall appear that during the year the quantity of lead produced on which the bounty is authorized exceeds 33,333 tons of 2,000 lbs., the rate of bounty shall be reduced to such sum as will bring the payments for the year within the limits mentioned ($500,000).

If at any time it shall appear to the satisfaction of the Governor-in-Council that the charges for transportation and treatment of lead ores in Canada are excessive, or that there is any discrimination which prevents the smelting of such ores in Canada on fair and reasonable terms, the Governor-in-Council may authorize the payment of bounty, at such reduced rate as may be deemed just, on the lead contained in such ore mined in Canada and exported for treatment abroad.

The said bounties shall cease and determine on June 30, 1908.

The Governor-in-Council may make regulations for carrying out the intentions of this act.

## THE IRON TRADE OF GREAT BRITAIN.

The iron and steel exports from Great Britain for the first half of 1903 show a substantial gain over last year. The total is reported at 1,874,153 tons, against 1,516,598 tons in the first half of 1901; while the value was £15,590,383, against £13,351,101 in 1902. The indications thus given are that the total for 1902 will be the largest for a number of years. It must be remembered, however, that the demand from the United States which has made quite a figure in the first half of the year is falling off. The London *Iron and Coal Trades Review* comments on these exports as follows:

"An examination of the details of our exports for the six months shows that the chief increase has taken place in our exports of railroad iron and steel, which were 406,829 tons in 1903, against 345,500 tons in 1902, and 282,505 tons in 1901. Another progressive trade is that of galvanized and corrugated sheets, of which our exports in 1903 have been 177,155 tons, against 160,520 tons in 1902, and 121,731 tons in 1901. The only other branch of exports showing a notable advance is pig iron, of which in the first six months of 1903 we exported 595,458 tons, against only 377,530 tons in 1902. Against this, however, there has been a decrease from 135,949 tons to 81,535 tons in our exports of unworked steel, mainly owing to the diminished demands of India, Australia and the United States.

"Some months ago there was a general anticipation that the demand for European iron on the part of the United States was not likely to proceed much farther, and might at any time be expected to come to an end, except in so far as normal requirements were concerned. This has not proved to be the case. We exported to that country in the first six months of 1903 a total of 260,812 tons of pig iron, against 81,903 tons in 1902, and 20,101 tons in 1901. In other branches our exports to the United States have been unimportant, and in some, as in that of tinplates, have materially fallen off, compared with those of 1902.

"So far as our imports of iron and steel are concerned, the figures for the six months show an increase of £172,266 compared with 1902, and an increase of £630,438 compared with 1901. This compares with decreases in our corresponding imports of machinery and of other metals and manufactures thereof, to the extent of £153,031, and £1,119,742, respectively, in 1902."

Imports of iron ore for the six months were 3,276,688 tons, of which 2,594,523 tons were from Spain; a total increase of 220,171 tons over the first half of last year.

ARMOR-PLATE IN RUSSIA.—As the Obukoff and Izhora Works on the Neva have not been able to cope with the greatly increased demand for armour-plates for use in the Russian navy, the Ministry of Marine has been compelled to order that material from foreign makers. With a view to keeping these orders at home the Pultiloff Works, in St. Petersburg, and the Nikopol-Marinpol Works, in South Russia, intend to turn out armor-plates on the most improved modern system. Hitherto, the Putiloff Works have produced at a loss rolled steel and steel parts used in shipbuilding. However, that portion of the works is about to be reorganized, and only armor-plates will be turned out.

## ABSTRACTS OF OFFICIAL REPORTS.

*North Star Mining Company, British Columbia.*

The annual report for the year ending May 31, 1902, of this company, which operates a silver-lead mine at Kimberley, East Kootenay, just issued, states that development work carried on during the period under review has not resulted in the disclosure of any large additional ore bodies, "although indications are very encouraging." A dividend was paid for the quarter ending August 31, but on December 1 the directors decided that it was in the interests of the shareholders to suspend payment of further dividends in order to keep the company in a strong financial position and enable them to continue development work to depth and ensure the full exploration of the property. The total amount of development work done during the year amounted to 12,166 ft. of drifting, cross-cutting, sinking, raising and diamond drilling. The work, it is stated, from now on will be more confined and not so scattered as last year. The theory that the ore deposits were only to be found on the surface, or rather that there was small chance of finding them at depth, was, in the opinion of the manager, advanced on insufficient evidence.

During the year 3,426 tons of ore were shipped, the assay value of which averaged 29.5 oz. silver and 36.2 per cent lead. Very considerable satisfaction is expressed at the announcement of the Dominion Government's decision to afford the silver-lead mining industry in British Columbia much-needed assistance in the form of a bonus of 75c. on every 100 lb. of lead smelted in the country up to a maximum annual amount of 33,000 tons. The conditions under which this subsidy is granted are such as not only to insure a return of prosperity to silver-lead mine operators, but further conduces to the upbuilding of the home smelting industry, while provision is at the same time made for the maintenance of treatment charges on a reasonable basis.

*Phoenix Consolidated Copper Company.*

This company is opening a copper mine in the Lake Superior region in Michigan. Its statement for 1902 shows receipts from calls on stock, $200,000; interest, etc., $1,892; total, $201,892. Expenditures at the mine were $229,410; general expenses, $2,072; a total of $236,482, or $34,590 more than receipts. The balance on hand was therefore reduced from $47,584 on January 1 to $12,994 at the close of the year.

President J. R. Stanton's report says: "During the past year a railroad connecting the West Vein shaft and the St. Clair shaft with the mill site has been completed and partially equipped. The railroad is about 3.5 miles in extent. A mill site was selected on Eagle River about 1 mile from our main location and ground was broken during the summer for the foundations of a one-head stamp mill. Many delays in receiving the necessary materials for the erection of the mill building, and the machinery for its equipment, have been the cause of its non-completion at this date. Work is being pushed with the utmost vigor, and the early operation of this department is confidently expected. It will be remembered that all of our materials, supplies, etc., must be hauled by teams about 13 miles, the nearest point to railroad being at that distance.

"The incline shaft at St. Clair Mine has been completed to surface, the necessary hoisting plant has been installed and we are now in position to take rock from this part of our mine rapidly and economically. The plant at West Vein is in position to

begin the initial handling of our product from that point.

"The amygdaloid was encountered on the 6th level, south, at a distance of about 450 ft. from the shaft. The belt was cut through 94 ft. at this point. In the 7th level, it was again encountered about 120 ft. from the shaft and penetrated about 130 ft. Since the first of this year, we have met the belt in sinking the shaft, about 60 ft. below the 7th level, and at all points it looks very rich."

*Michigan Copper Mining Company.*

The report of this company for the year 1902 shows receipts as follows: Brought forward from previous year, $13,972; assessments paid, $190,471; sales of copper—166,898 lb. at 12.17c.—$20,319; interest, $1,115; total, $225,877. Expenditures at mine were $157,564; smelting and general, $7,381; total, $164,945, leaving a balance of $60,932 forward to current year.

Development work for the year included 528 ft. shaft sinking; 183 ft. winzes; 6,561 ft. drifting; and 991 ft. cross-cutting. The three shafts at the close of the year were 1,528 ft., 1,601 ft. and 355 ft. deep, respectively.

President John Stanton's report says: "The continued prosecution of openings during the year has developed bodies of heavy copper on the Branch Lode, and also has shown the continuance of copper-bearing ground on the Calico Lode. While nothing of value has yet been disclosed in the limited openings that have been made on the Minnesota Conglomerate, yet it is expected that with the junction of the Branch Lode with the Conglomerate, which is close at hand, bodies of heavy copper will be found, as in the case of a similar occurrence at a higher level from which the old Minnesota Company made its large production and dividends.

"The developments that have been made in the extensive openings of the mine seem to fully warrant the erection of a stamp mill and the commencement of production on a liberal scale, but arrangements for railroad connection and transportation of rock and supplies on a copper basis have not yet been satisfactorily adjusted, and the selection of a stamp mill site is dependent upon the choice of railroad connections. It is probable that these questions will be determined in a short time, meanwhile preparations are progressing for handling a large output, by the erection of shaft rock houses, a powerful hoisting engine, and a high duty compressor of large capacity, and it is expected that the temporary use of one head of stamps can be arranged for as soon as the railroad connection is made, which would enable production to be started before the erection of our own mill."

*Virginia-Carolina Chemical Company.*

The annual report of this company, for the year ending with June, show gross profits amounting to $3,231,377. From this amount there is to be deducted payments for depreciation and repairs amounting to $635,060 and interest on collateral trust loan amounting to $209,400. This left a net balance of $2,386,917. The dividends paid amounted to $2,359,221, leaving a surplus for the year of $27,696. Of the dividends paid $960,000 were on preferred stock and $1,399,221 on common stock. The gross profits showed a decrease last year, as compared with 1902, of $912,093, and the net profits a decrease of $885,065. The surplus above given compares with a surplus balance of $1,651,755 for the preceding year.

The company—the Southern fertilizer combination—has a capital stock of $12,000,000 in preferred shares and $27,984,400 in common shares. In addition to this there is a debt of $7,000,000 in collateral trust bonds bearing 5 per cent interest. These bonds were issued last year.

The following explanatory statement to stockholders is given in the report: "Your management desires to say that, at the beginning of the past fiscal year they deemed it wise to take advantage of the very large earnings of your company for the previous year to strengthen its position by substantially increasing its tonnage output within its territory, especially in view of the fact that the large sums expended for the past few years on improvements of and additions to your plants have increased their productive capacity fully 33 1-3 per cent. It was realized that this programme could be carried out only at the expense of some profit for the year and that moreover your company was confronted with a very decided advance in the price of materials, supplies and labor over the previous year. After considering the matter carefully, your management reached the conclusion that the ultimate benefit to be derived for the stockholders by securing a greater percentage and volume of business and tonnage outweighed the question of working solely to the end of larger profits for this one year.

"As a result of working steadily on this line, the business has been pushed from 779,003 tons the previous year to a total of 983,634 tons the past fiscal year, an increase of 26.3 per cent of actual business, in addition to which your company sold and had orders for 35,000 tons more (over 3½ per cent additional), which they were unable to ship owing to the inability of the railroads to furnish cars. Your management is clearly of the opinion that the securing of this increased business and tonnage will prove of far greater benefit and value to the stockholders in the future than any additional profits for this year, especially as the earnings for the past two years, considered together, have given an excellent average outcome.

"Your company commences its new fiscal year with a greatly strengthened position, and, as far as humanity can see, the outlook has never been more promising for the future."

## BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

*Royal College of Science Magazine and Journal of the Royal School of Mines. Volume XVIII., Part 8. May,* 1903. London.

*General Review of Mining in British Columbia. Bulletin No.* 11, *Bureau of Provincial Information.* Victoria, B. C.; Public Printer. Pages, 80; illustrated.

*Western Australia Year Book for* 1901. Compiled by Malcolm A. C. Frazer, Government Statistician. Perth, W. A.; Government Printer. Pages, 492; with maps.

*United States Census. Bulletin* 3. *Street and Electric Railways.* Prepared under supervision of W. M. Steuart. Washington; Government Printing Office. Pages, 196.

*The Markets on the Pacific for British Columbia Wood-pulp and Paper. Bulletin No.* 14, Bureau of Provincial Information. Victoria, B. C.; Public Printer. Pages, 28.

*Transactions of the Australasian Institute of Mining Engineers. Volume IX., Part* 1. Edited by A. S. Kenyon, Secretary. Melbourne, Victoria; published by the Institute. Pages, 144; illustrated.

*West Virginia Geological Survey. Volume II. Levels Above Tide. True Meridians. Reports on Coal.* By I. C. White, State Geologist. Morgantown, W. Va.; published by the Survey. Pages, 728.

*United States Geological Survey. Mineral Resources of the United States. The Production of Sulphur and Pyrite in* 1902. By Jos. Struthers. Pages, 20. *The Production of Graphite in* 1902. By Jos. Struthers. Pages, 12. Washington; Government Printer.

*Geological Department of Tasmania.* (1) *Report on the Tasmania Mine, Beaconsfield.* By W. H. Twelvetrees. Pages, 8. (2) *Report on the Iron and Zinc-Lead Deposits of the Comstock District.* By Geo. A. Waller. Pages, 36; illustrated. (3) *Report on the Mineral Resources of the Districts of Beaconsfield and Salisbury.* By W. H. Twelvetrees. Pages, 64; illustrated. Hobart, Tasmania; Public Printer.

## BOOKS REVIEWED.

*A Glossary of Spanish-American Mining and Metallurgical Firms.* Compiled by Arthur S. Dwight. New York; the American Institute of Mining Engineers. Pages, 96. Price, 50 cents.

This is a pocket book of a most useful kind. It is based on a glossary which was prepared for the Mexican meeting of the American Institute of Mining Engineers in 1901. The compiler, Mr. Arthur S. Dwight, has been aided by a number of well-known mining engineers, so that the glossary will be found to be an up-to-date and most useful vade-mecum to those who are engaged in professional work in Mexico. It is about 4 by 6 in. in size, and contains 96 pages, with a number of blank sheets for notes.

*Queensland, Annual Report on Mines.* A. R. McDonald, Under-Secretary for Mines. Brisbane, Queensland; Public Printer. Pages, 180; with maps and illustrations.

This report gives an excellent synopsis of mining operations in the State of Queensland for the year 1902. In spite of the drawbacks resulting from drought and other causes, mining was fairly prosperous in the State during the year, as is shown by the carefully prepared statistical tables contained in this report. Gold is the chief interest of Queensland; but there are other products, including coal, and among the metals, tin, bismuth, tungsten ore, manganese ore and molybdenite. There is also a considerable production of opals, which are found in several districts.

Besides the general statistical information, many particulars are given about different districts together with reports on mine accidents, and accounts of improved machinery and appliances to be used at different points. The reports of the inspectors and wardens of the different districts are appended.

*Briquettes as Fuel in Foreign Countries. Special Consular Reports. Volume XXVI.* Prepared in the Bureau of Foreign Commerce, Department of State. Washington; Government Printing Office. Pages, 156; illustrated.

This volume contains a number of reports especially prepared by United States Consuls abroad, on the manufacture and commercial use of briquettes. Owing chiefly to the cheapness of coal in the greater part of the United States, briquette manufacture has never been entered into here on an extensive scale. Recent events, however, have drawn attention to this method of utilizing coal waste and similar substances, and the reports here given from countries where briquette making is an important industry possess considerable interest. The longer and more valuable reports are from Germany, France, Belgium and Austria. They contain much information about the use and sale of manufactured fuel abroad. The illustrations generally show machinery and arrangement of plants. Those who are interested in this industry can find much information in this report.

*Lake Superior Mining Institute. Volume VIII.* Ishpeming, Mich.; Published for the Institute. Pages, 92; illustrated.

This volume contains the proceedings of the Lake Superior Mining Institute at the annual meeting in 1902. These include a number of papers, some of which have been abstracted from time to time in the JOURNAL. They are here presented in full, with the discussions for which their reading gave occasion. The papers included are Moisture in Lake Superior

Iron Ores, by Dr. N. P. Hulst; Use of Steel in Lining Mine Shafts, by Frank Drake; Geological Work in the Lake Superior Region, by C. R. Van Hise; Changing House at West Vulcan Mine, by William Kelly; Comparison of the Origin and Developments of the Iron Ores of the Mesabi and Gogebic Ranges, by Kenneth Leith; Efficiency Tests of an Air Compressor, by J. Parke Channing; and Mine Machine Shops, by J. F. Jackson. Besides the illustrations in the text, maps of the Mesabi and Vermillion iron ranges are appended. The discusions on the different papers possess much interest, and the whole report shows that the Institute is an active and useful body.

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*The Story of a Grain of Wheat.* By William C. Edgar. New York; D. Appleton & Co. Pages, 196; illustrated. Price, $1 net.

The author of this book, who is thoroughly familiar with the milling and utilization of wheat, if not with its growth, has made an exceedingly interesting book out of his subject. An historical introduction gives the history of what one may call the "royal grain" from the earliest ages. It describes briefly the different grades, kinds of wheat and their uses, with many other interesting particulars. The larger part of the book is devoted to wheat after it leaves the growers' hands—that is, to the milling and marketing of wheat and flour; and this also presents a very interesting study. The gradual growth of milling processes is traced, up to the invention of the roller process, which has practically superseded the mill-stone, which served our ancestors for so many hundred years. A chapter is devoted to the spread of wheat-growing and milling on this continent, and the extraordinary developments of the great wheat-growing regions of the North, especially in Canada; and the writer concludes with a vehement protest against the short-sighted fiscal policy which threatens to move the center of the milling industry from the United States to the Canadian side of the line, to the great injury of our millers.

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*Modern Electrolytic Refining.* By Titus Ulke. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 176; illustrated. Price, $3 net.

Mr. Ulke's book is an attempt to bring our published information on electrolytic copper refining up to the latest date. It will be readily understood that this is a somewhat difficult matter in view of the secrecy which is maintained at many plants, and the difficulty of securing reliable information. It may be said that he has succeeded fairly well, and that his book may be accepted as a statement of present practice.

The first chapter treats of the development and methods of electrolytic copper refining and of the apparatus used. The first chapter gives descriptions of electrolytic copper refining works in the United States, in Great Britain, Germany, Austria, France and in Russia. By far the larger and more important of these works are in the United States, where we find such plants as those of the Raritan Copper Works, the Anaconda, the Nichols, the Baltimore and others. So far as we can judge, these descriptions are generally correct, though they vary much in fullness. Some of the more recent works, such as the Delamar Refining Works, in New Jersey, which is a very recent plant, are dismissed with a very brief and satisfactory account. The foreign works vary very much in the space given them, some of the accounts being quite full, and others very much condensed.

The concluding chapter gives cost estimates of a refinery for copper and nickel. The specifications refer to plans prepared for custom refining works to be located at the Sault Ste. Marie, and the figures are based upon the use of cheap water-power.

An appendix gives a chronological list of patents, books and special articles on electrolytic refining methods and apparatuses. This is very convenient, and has been brought up to date so far as books and articles are concerned, though the list of patents does not seem to be altogether complete, the latest one given being dated in March, 1902. The book will be convenient as giving the latest and probably the best practice.

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*Geological Survey of Washington. Volume II. Annual Report for 1902.* Henry Landes, State Geologist. Tacoma, Wash.; State Printer. Pages, 296; illustrated.

The Geological Survey of Washington is comparatively new, and still has a great deal of work before it. It has made an excellent beginning, as we noted about a year ago, when the first volume of its report appeared. The present volume is divided into two parts. The first, prepared by Mr. S. Shedd, relates to the building and ornamental stones, of which the State possesses a great variety; the more prominent and valuable of these are granite, tufa and basalt, sandstone, marble and serpentine. Development of these stone resources is comparatively limited as yet; but quarries of marble of the finest quality have already been opened. In addition to the description of the different deposits, chapters are added on various tests of stone, and also a chapter on methods of quarrying and working stone, which, it was believed, would be of value to the quarry owners of the State. The industry is capable of a great development, and the quarries of Washington could supply not only all the demand of the State itself, but the entire Pacific Coast, should opportunity be presented.

The second part, by Messrs. Henry Landes and C. W. Ruddy, treats of the coal deposits of Washington. In this the writers set forth with some detail the extent of the coal-fields, the amount of development which has been done in and upon them, and their commercial value. The time thus far afforded to the Survey has naturally limited the work which could be done in examining the coal measure; nevertheless, a great quantity of facts has been gathered, and are here presented. The report includes an introductory chapter treating on the geographic relations, topography of the coal-fields and the geological formations. The second chapter describes with some detail the different coal-fields which have so far been located and opened. The third chapter treats of the coal seams, the different varieties of coal mined, and the composition and heating powers of the coal; while the fourth section is chiefly statistical, showing the production of the State, and of the different collieries, the production of coke and the markets to which Washington coal is sent.

The coals of Washington include bituminous coking-coals, semi-bituminous steam coal and lignite, the latter generally of very excellent quality and superior to any other lignite which has yet been found on the Pacific Coast. In certain limited areas anthracite has been found; but not in sufficient quantities to be of any commercial value. The greater part of the Washington coal is free burning long-flame coal, and makes excellent steam fuel. Careful evaporative tests were made some time ago at the Mare Island Navy Yard, which are presented in this volume, together with analyses of the coals. There is no doubt that Washington is better provided with fuel than any other State on the Pacific Coast; and this, with other advantages, should make it in time an important manufacturing State, especially as iron ore has also been found.

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## RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DUTY ON RESISTANCE STRIPS OF NICKEL ALLOY.—So-called resistance strips, composed of nickel alloy, nickel being the component material of chief value, in rolls 200 feet long and 2 inches wide, are dutiable at the rate of 45 per cent ad valorem under paragraph 193, act of 1897, and not dutiable under the provision of paragraph 185 of said act as "nickel alloy . . . in pigs, ingots, bars or sheets."—Appeal of Baker & Co. from Collector of Customs at New York; Board of General Appraisers.

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DUTY ON LITHOPHONE.—The United States Circuit Court of Appeals has decided that lithophone is dutiable at 1¼c. per lb., as sulphide of zinc, and not at 1c. per lb. as a "white paint or pigment containing zinc." This decision affirms previous decisions of the Board of General Appraisers and the United States Circuit Court. This case, which is now finally settled, has been before the courts for a long time. The market for lithophone has lately been extending a good deal. Formerly the American demand was supplied from Europe, but now there are several manufacturers of lithophone in this country, who are well safe-guarded against a European competition by the tariff. The recent decision of the courts is in favor of the American producers.

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DUTY ON STEEL STRIPS.—The merchandise in question is steel in lengths of from 200 to 250 ft. and from 4 to 5 ins. in width and very thin. The goods were returned as cold rolled and brightened sheet steel in strips under 0.025 in. thick, valued at under 4c. per pound, and duty was assessed at the rate of 1.2c. plus 1c. per pound under the provisions of paragraphs 135 and 141 of the Tariff Act. Additional duty of 1c. per pound was levied under the contention that the strips of steel had been brightened or finished better than steel which has been cold rolled, smoothed only, on which class of steel a duty of only 1.2c. per pound is assessed. The importers claimed that the goods undergo no process designed to effect the surface, and that the steel is imported chiefly for use as springs in car seats, for which purpose the condition of its surface would be of no advantage. The contention of the importers is set aside, and the decision of the collector, imposing additional duty, is upheld.—Appeal of Washburn and others from Collector of Customs at New York; Board of General Appraisers.

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## CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

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### *A Disclaimer.*

Sir.—Myra B. Martin, Walter S. Logan, and perhaps others from 27 William street, New York, are advertising my name in connection with the Copete Mining Company. I happened to have endorsed the Copete mine as a good prospect for a supposed friend some years ago. But a mine is a mine and a company is a company. Concerning the Copete Mining Company I know nothing, and it has no authority to use my name in its newspaper advertising, nor have I any endorsement whatever to give it.

ROBERT T. HILL.

New York, July 15, 1903.

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### *Difficulties in Chlorination.*

Sir.—I would like very much to be put upon the track of information concerning the settling by the electric current of fine precipitates in solution. If any of your numerous readers have encountered the same difficulties, and can give some notes from their experience, it will be of much value, not only to the writer, but to others who have been working upon the same lines. The case in which I am interested is that of settling a gold precipitate from the chlorination barrel solution. Part of this precipitate is so fine that it takes a long time to settle, and clogs the filter-presses badly, requiring frequent change of the canton flannel used in them. This re-

sults in considerable expense for renewing that article, as well as in delay in obtaining the precipitate from the solution. Now I would like to know if this precipitation can be hastened in any way by the use of the electric current.

Another question which interests me is whether the gold could be obtained from the solution filter from the barrels by an electrical deposition process? I would like to know whether it could be plated upon thin sheets of that metal by the use of the electric current, after the fashion in which copper is obtained from a solution of the sulphate. The books bearing upon these subjects do not seem to give the required information, which I would like to have.

Another question of interest in the chlorination process seems to me to be, whether the pressure in the barrels has an influence upon the extraction of the gold from the ore in treatment.

Denver, Colo., July 1. F. A.

*Cyaniding Sulpho-Telluride Ores—A Correction.*

Sir.—In my article on Cyaniding Sulpho-telluride Ores, published in the ENGINEERING AND MINING JOURNAL July 11, the sentence preceding the table of comparative costs, on page 53, should read:

"The latter are treated at the smelting works; the following table shows the expenditure per ton of ore treated by the rival processes for August, 1901."

Please make the correction.

PHILIP ARGALL.

Denver, Colo., July 16, 1903.

*Some Views on Corundum.*

Sir: I should think, considering the small amount of knowledge existing on the subject, that you, and users of corundum, would be only too glad to get information. Twenty years' experience in the manufacture of my "Heaton's bed-rock wheels" and twelve years and $20,000 spent since prospecting for testing and close working with corundum have given me some information on the subject. Corundum is not a product of heat; but a secondary formation of olivine and hornblende dissolved out by rains and dew, and re-crystallized, just as alum crystallizes from clayey rocks, or marble results from limestone. Olivine or dunite is green, or greenish. Hornblende is black and white. If either of these rocks are made red-hot, the alumina present is proven by the rock turning red or brown, like a brick after burning. If rock-bearing red corundum had ever been hot, the rock would be red, and the red corundum white. The mother rock of corundum no doubt was forced from below in a plastic state; if it had been forced up hot, bursting through the hornblende floor, the hornblende, at the points of contact, would be brown or red; but it is not. Corundum crystals imbedded in solid rock, as often found, no doubt crystallized out first, and in time the plastic rock closes around the crystals. If corundum was a product of heat, it would be like lead or metal; but, on the contrary, it consists of a mass of cubes, which may be considered its ultimate atoms, evidently crystallized from water containing the matter. Close examination shows each of the cubes (which are built up to form what we call corundum) are covered by a film more or less thick. In some corundum the lines of division between these crystals or cakes are distinctly seen, and are white or opaque. It is this surrounding film covering each cube of a lump of corundum which makes the lump translucent instead of transparent. The ultimate atom or cube of corundum is an oxyde of alumina, like the ruby or sapphire; that is, a jewel; while the film coating it (which causes the lumps of corundum to be translucent instead of transparent) is composed of silicate of alumina, or magnesia, or both. This siliceous matter permeates the whole mass or body of the rock that we call corundum. It was exuded, or driven out by the ultimate atom when it crystallized; and this silicate of alumina, or magnesia, or both—which goes with the waste, or flour, when the rock corundum is crushed and graded for abrasive purposes—is what causes all flour corundum to be inferior, for polishing purposes, to flour of emery. Flour corundum is contaminated with the siliceous coatings of every crystal, or cube, in the mass, and this siliceous or soapstoney contamination prevents any small atoms of the crushed cubes from cutting; it forms a glove or obfuscating jacket to the fragments of real corundum. I could write columns all well worth reading about zoesite, margarite, chlorite and other 'ites little understood.

CHARLES HEATON.

Corundum, Clay Co., N. C., July 16, 1903.

## QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be giveu to questions submitted by subscribers.

*Gilsonite.*—What is the market value of gilsonite, and about how large is the consumption? Who buys it? We are contemplating the development of such a mineral deposit.—S. A. E.

*Answer.*—Gilsonite is a pure form of bitumen, and is higher-priced than asphaltum, but the production in the United States is comparatively small. Utah is the only State supplying this mineral, although at one time small quantities were mined in Colorado. The production has been curtailed by litigation over the ownership of the Utah deposits, but in time the industry may grow. Gilsonite sells, f. o. b. New York, at 3 to 3¼c. per lb. The business is closely controlled, the largest dealer in New York being J. B. Lamson & Co., 77 Maiden Lane.

*Bone-Ash.*—Can you give me, in outline, the commercial process of manufacturing bone-ash for assayers' use? Please state, also, why sheep's bones—and sometimes horses' bones—are stated to be the best for this purpose?—M. W.

*Answer.*—In a general way, it may be said that the process of making bone-ash is simple, consisting of freeing the bones, as far as possible, from dirt and extraneous matter, and from grease; and then calcining, sifting and pulverizing the ashes. It is not possible to obtain further details of the process, as the few who do the work are not willing to explain. As to the preference for ash from sheep's bones, or horses' bones, it seems to be general among assayers, though none seem able to assign a reason for it. Sheep's bones are said to make a cleaner ash than those of cattle; possibly because they are smaller, and would naturally be more thoroughly calcined.

*Magnesite.*—I notice in your issue of July 11 an article written by Mr. Charles C. Schnatterbeck, who had made quite a thorough investigation on magnesite, its uses and value. I would like to know who deals in this mineral, and also the nearest source of supply to Wisconsin, say, of one to ten tons per month.—W. A. L.

*Answer.*—Unfortunately you are situated far from the source of supply of magnesite, and must therefore pay a high rail freight. On the other hand, since you desire only a comparatively small quantity, and as some mineral of fair quality is being mined in California, you may possibly save something in the cost of transportation, though freight rates from the Pacific Coast are generally high. At present the California magnesite is consumed by the local manufacturers of carbon dioxide and by several paper mills on the Pacific Coast. You might correspond with the Union Iron Works, who are the leading miners in California. If your consumption should increase and you should find it difficult to get supplies from California, you would have to negotiate with the importers of Grecian or Styrian magnesite in the East. Of course the freight charges would be high, probably more than half the cost of the crude magnesite. It would be unsatisfactory to estimate the cost of delivering imported magnesite at your works in Wisconsin, as much would depend on the quantity shipped and your agreement with the dealer. Since Grecian magnesite is the cheapest and purest sold, we would suggest that you correspond with Mr. Solon J. Vlasto, 2 and 4 Stone street, New York City, who practically controls the market here. Should you care to try Styrian magnesite you can communicate with the Harbison & Walker Company, at Pittsburg, Pa.

## PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared:

*Week Ending July 14, 1903.*

733,373. CONVEYER.—Junius F. Cook, Johannesburg, Transvaal, South Africa. In a belt conveyer, the combination of cylinders for carrying the belt, a clutch adapted to move one of said cylinders intermittently, means for positively moving the clutch in the inoperative direction, and a spring for moving said clutch in the opposite directions to actuate said cylinder.

733,385. MACHINE FOR PILING METAL SHEETS.—Berthold Goldsmith and Charles W. Bennett, Elwood, Ind., assignor to American Tin Plate Company, New York, N. Y. The combination, with a set of rolls for performing the final rolling operation preparatory to annealing sheets of metal, and the annealing-box for receiving such sheets, said box being provided with a wall extending upward from its bottom against which the sheets may be arranged, of a mechanical transporting device consisting of a continuously-operating carrier arranged to engage the plates in succession and transfer them directly from the rolls to the box, means for arranging said plates evenly in the box, and means for adjusting the continuously-operating carrier and the arranging means with relation to the annealing-box and parallel to the wall thereof.

733,389. PROCESS OF REMOVING SILICA FROM COKE.—Chas. M. Hall, Niagara Falls, N. Y. A process of purifying carbon containing silica, which consists in mixing with the same a metallic fluoride and subjecting the mixture to heat until the fluoride has combined with the silica to form silicon fluoride.

733,396. MOLD FOR ARTIFICIAL STONE.—Edgar B. Jarvis, Toronto, Canada. In a mold the combination of side walls; a vertical transverse plate; and a frame carrying the plate, comprising a cross-bar and clamps adapted to detachably connect the frame with the side walls.

733,428. MACHINE FOR FORMING TAPERED TUBES.—Walter C. Sargeant, Melrose, and John J. Barker, Arlington Heights, Mass. The combination with a tapering mandrel, means to revolve it, a tool-carrier provided with a plurality of tools radially disposed with relation to said mandrel and provided with curved and straight working surfaces, means for moving said tool-carrier longitudinally of said mandrel, mechanism for automatically feeding said tools toward the mandrel as said carrier is moved longitudinally thereof, and means for rendering said automatic feed mechanism operative and inoperative without movement of said tools.

733,452. CONDENSER FOR NITRIC OR OTHER ACIDS.—William Bate, Hayle, and Frederick G. Orme, London, England. In a condenser for nitric and other acids of the vertical water-cooled type, the combination with vertical condensing-pipes of an independent open-topped water-jacket around each of said water-cooled pipes, and means for supplying water to, and emptying each jacket independently of the other jackets.

733,465. PROCESS OF OBTAINING AMMONIA FROM AMMONIA-CONTAINING GASES.—Herbert H. Dow, Midland, Mich. A process of recovering ammonia from ammonia-containing gases which consists in bringing such gases into contact with a substance which will combine with the contained ammonia, adding an alkaline-earth hydrate, blowing out the ammonia so liberated with a gas, adding carbon dioxide, and absorbing the ammonia by means of bitter water obtained from a natural brine.

733,467. PROCESS OF MANUFACTURING BROMIDES FROM BROMIDE-CONTAINING SOLUTIONS.—Herbert H. Dow, Midland, Mich. The steps in the process of manufacturing a bromide from bromide-containing solutions which consist in bringing air, first into contact with a solution containing free bromide and then into contact with pure bromide.

733,485. MEANS FOR THE CONTROL OF THE ELECTRICAL DRIVING OF REVERSIBLE ROLLING-MILLS.—Carl Ilgner, Breslau, Germany. An arrangement for regulating the velocity of electrically-driven reversible roller-mill motors without the use of resistances to be switched in and for effecting a gradual taking off of current from the main-current source, said demand of current not rising to the full amount of current consumption corresponding to the work required by the rolling-mill motor on starting and on running, consisting of a rolling-mill motor supplied with a current from a motor-dynamo driven directly from the main source of current and provided with flying masses, the electromotive force transmitted to the rolling-mill motor being regulated by alteration of the field-magnet excitation of that part of the motor-dynamo which generates the current for the rolling-mill motor.

733,492. PARTITION-PLUG FOR OIL-WELLS.—Charles S. Little, Montpelier, Ind. A device for isolating different portions of an oil-well from each other, consisting of a partition-plug adapted to bear against the wall of the well and provided with an anchor or support for sustaining the same at the proper height in the well.

733,505. PUMP-ROD ADJUSTER FOR OIL-WELLS.—Allen C. Price, Renfrew, Pa. In a pump-rod adjuster, a cross-head having a bore eccentrically disposed therein, the axis of the bore being above that of the cross-head.

733,552. MINER'S CRATE.—George R. MacDonald, Seattle, Wash. An inner adjustable section constructed with a corrugated top plate and perforated ends and side plates and removable pins adapted to lock the aforesaid pieces of the section together by passing through interfitting hinge members provided upon the plate edges, in combination with an outer water-tight vessel and chains.

733,573. RUSTPROOF AND FIREPROOF COMPOSITION.—Giovanni Bevilacqua and Giuseppe Bevialacqua, Genoa, Italy. A non-conducting rustproof composition comprising filaments of silicate, liquid silicate of potash, powdered asbestos, calcinated magnesia, a coloring material, powdered cork and powdered pozzolana.

733,574. GRINDING AND PULVERIZING MILL.—Thomas Breakell, Wirksworth, near Derby, England. In combination, the cylindrical casing, granding-shoes of gradually-increasing thickness fixed to the inner periphery of said casing and arranged with relatively small spaces between adjacent shoes, a shaft adapted to rotate in said casing, a disk carried by said shaft, grinding-shoes fixed to said disk with relatively small spaces between adjacent shoes, a frame secured to one side of said casing and a screen carried by said frame and inclined to the plane of said disk and perpendicular to a vertical plane containing said shaft.

733,578. PROCESS OF SMELTING METALS AND METAL COMPOUNDS.—Georg Egly, Charlottenburg, Germany. A process of smelting metals consisting in smelting the same in an electric furnace the lower carbon electrode of which is covered by a scoria possessing a sufficient conductivity and remaining solid or nearly solid at the temperature at which the smelting process takes place.

733,590. PROCESS OF OBTAINING METAL SULPHATES FROM MATTES.—Otto Meurer, Cologne, Germany. A process for obtaining metal sulphates from ores which process consists in fusing the ore, eliminating the gangue, disintegrating the matte, then mixing such disintegrated matte with iron bisulphide and with the sulphate of an alkali and coal, then heating the mixture in the absence of air, then allowing the mass to crumble in air, and oxidize in air and finally washing the oxidized mass.

733,597. ROOFING COMPOUND.—George E. Reynolds, Pueblo, Colo. A cement roofing compound, comprising pure coal-tar, turpentine asphaltum, gasolene, asbestos fiber, fine mica and plumbago, incorporated together.

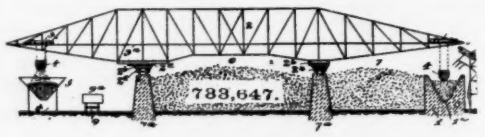
733,602. METAL ANODE.—Harry E. Starrett, Chicago, Ill., assignor to the Hanson & Van Winkle Company. A metal anode of an elliptical cross-section having a comparatively flat but convex curvature adapted to be placed opposite a cathode to compensate for the otherwise greater flow of current at the edges of the anode.

733,612. PROCESS OF MAKING PIGMENTS.—William J. Armbruster, St. Louis, Mo. A process of making pigment which consists in mixing solutions of barium hydrate and other soluble barium salts, a salt of zinc, and a sulphate capable of precipitating the barium as a sulphate.

733,623. GATE FOR COAL OR OTHER POCKETS.—Jeremiah Campbell, Newton, Mass. An escape-passage having an outlet provided with curved side edges or borders and a gate for opening and closing the same movable in a curved path along said curved edges or borders and having a curved closing plate or bottom, the said gate also having means for preventing, when closed, the escape of dust from the passage from either end of its bottom.

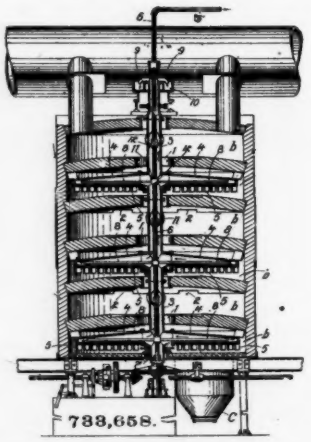
733,643. ELECTROLYTIC APPARATUS.—Leo Gurwitsch, Kiew, Russia. In electrolytic apparatus the combination, with a receptacle, of iron plates provided on one side with two outer plates being connected with the poles of the dynamo and the intermediate plates being insulated, and means for spurting mercury against the grooved side of the said plates.

733,647. APPARATUS FOR HANDLING ORES, ETC.—Frank K. Hoover and Arthur J. Mason, Kansas City, Mo. In a plant for handling ore and other material, the combination with unloading devices located along a dock or




other place of delivery, of a stationary temporary receptacle within reach of said unloading devices adapted to receive the cargo of the vessel or other carrier, and a transfer truss or frame equipped with carrying devices located inland of said receptacle and capable of reaching to every part of the latter and serving to transfer its contents to inland receptacles or carriers.

733,658. ROASTING-FURNACE.—Frank Klepetko, New York, N. Y. In a furnace having a plurality of hearths, a rotable hollow shaft passing through the hearths, a series of hollow arms radiating from said shaft, and extending

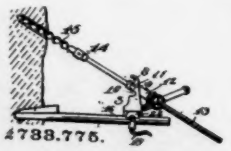



into the several hearths, an inner stationary water-feed pipe located within the shaft, a series of branches or distributing-pipes located within and communicating with the interior of the hollow arms and freely rotating therewith about the feed-pipe, the latter discharging the water through its peripheral walls into the inner ends of the distributing-pipes, whereby the same is caused to circulate through the arms and hollow shaft to a point adjacent to the feed end of the feed-pipe.

733,662. SOLDERING OF ALUMINUM.—Hjalmar Lange, Vesteras, Sweden. A process of soldering aluminum which consists in mechanically cleaning the surfaces, heating the same, covering said surfaces with a layer of molten zinc, then covering the zinc-coated surface with a layer of molten aluminum, and then finally holding said surface in contact while subjected to sufficient heat to melt the alloy.

733,739. APPARATUS FOR USE IN METALLURGICAL PROCESSES.—Frank H. Officer, Robert H. Officer, Joachim H. Burfeind, and James W. Neill, Salt Lake City, Utah. A treating tank or vat for metallurgical operations having a conical bottom provided at its apex with a suitable discharge-opening connected with a delivery-pipe leading to a filter, in combination with a gas delivery pipe extending downward centrally through the tank and having its outlet located near the apex of the conical bottom and of such form as to deliver a stream or streams of air or gas under pressure directed downwardly and outwardly at or near the apex, the space between said pipe and conical sides of the tank being free to permit free circulation of the contained pulp from the apex upwardly through the center and down along the conical sides in a continuous stream.

733,775. COAL-DRILL SUPPORT.—Alexander Walker What Cheer, Iowa, assignor to What Cheer Drill & Miners Tool Company, What Cheer, Iowa. In a coal-drill sup-

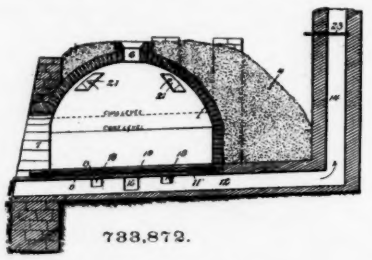



port, a supporting-bar, and a chair at right angles thereto and longitudinally and laterally adjustable thereon, said chair being provided with a series of notches or sockets for the vertical adjustment of the drill.

733,804. CONVEYER.—Frederick E. Blaisdell, county of Surrey, England. A conveyer-track comprising, in combination, a series of spindles, rollers arranged at intervals on said spindles, the rollers on each spindle extending into the spaces between the rollers on the adjacent spindles, and means for rotating and for supporting said rollers.

733,859. PROCESS OF EXTRACTING PRECIOUS METALS FROM THEIR ORES.—Joseph W. Maxwell and John W. Sawyer, Louisville, Ky. In a process of extracting the precious metals and other values from their ores, extracting the metalloids; removing them from the ore and ore-treating receptacle; consisting in treating the powdered ore with heat, chloride of sodium, oxygen, nascent chlorine, a current of chlorine gas; volatilizing the metalloids; carrying the volatilized metalloids and metalloid compounds produced by this treatment out of the ore and ore-treating receptacle, by passing a current of chlorine gas through the ore and ore treating receptacle.

733,872. COKE-OVEN.—George S. Ramsey, St. Marys, Pa. A coke-oven provided with bottom flues and having a floor




provided with a gas-excluding packing composed of fibrous and granular material, the former being adapted to hold the latter.

733,875. GRINDING-MILL.—Hermann Scharbau, Magdeburg, Germany. A grinding-mill comprising in combination with the usual pulley and pendulum a ball at the upper end of the pendulum resting in a ball-bearing in the frame of the machine, a cross-head fixed to the upper end of the pendulum and helical springs between the ends of the cross-head and the inner surface of the pulley.

733,896. PROCESS OF MAKING LITHARGE.—John W. Bailey, Jersey City, N. J., assignor to Union Lead and Oil Company. A process of making litharge which consists in subjecting metallic lead to the flame of a hydrocarbon fuel atomized by a jet of steam.

733,907. SAFETY-CHAIN FOR MINING-CAGES.—Harry Hanson, Los Angeles, Cal., and Frederick L. Dwight, Bisbee, Ariz. A frame for mining-shafts provided with lateral timbers and front and rear timbers, the upper and inner edges of said front and rear timbers having recesses therein, in combination with a cage having a platform and movable chair-legs secured thereto, and means whereby the said legs of the chair are thrown out of contact with said recesses.

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## GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

*Week Ending June 27, 1903.*

11,671 of 1902. NICKEL EXTRACTION.—C. Perron, Rome, Italy. Method of extracting nickel from low-grade sulphide ores by lixurating with ammonia sulphide.

12,144 of 1902. MINER'S LAMP.—W. Patterson and C. Darrah, Manchester. Improvements in miners' lamps, chiefly in the apparatus for electrically igniting the wicks.

16,330 of 1902. DISINTEGRATOR.—T. P. Sharman, Sidcup. A disintegrator for gold gravels consisting of a revolving horizontal drum driven by a water wheel mounted on the same axle.

20,245 of 1902. IRON REFINING.—C. G. Carson, A. Miller and F. Hurst, Redding, California, U. S. A. A continuous refining furnace for iron in which the metal is treated in two chambers consecutively and afterwards drawn off without stopping the process.

964 of 1903. PRODUCING ALUMINUM.—G. Gin, Paris, France. Producing aluminum by electrolyzing a molten mixture of fluoride of aluminum and sodium sulphide.

6,521 of 1903. PIGMENT.—W. J. Armbruster and J. Morton, St. Louis, Mo., U. S. A. Improved method of producing a pigment composed of zinchydrate and barium sulphate.

7,307 of 1903. LOCK FOR MINERS' LAMPS.—D. Thomas, D. J. Gower and D. Griffiths, Glamorgan. Improved methods of locking and unlocking the parts of miners' safety lamps.

7,855 of 1903. ALLOY.—E. Polte, Magreburg, Germany. An alloy of tungsten and lead suitable for the manufacture of ammunition made by hammering together particles of the respective metals.

8,821 of 1903. PIPE FOR BLAST-FURNACE GASES.—H. Savage, Seraing, Belgium. Construction of piping leading gases from blast furnaces in such a way as to prevent the entrance of air.

## TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

## PERSONAL.

Mr. Percy L. Fearn is in New York.

Mr. Cecil G. Fennell is in New York.

Mr. A. C. Beatty is at Guanajuato, Mex.

Mr. R. S. McCafferty, of New York, is in Nevada.

Mr. M. J. True has returned to Salt Lake from Boston.

Mr. J. R. Gifford, of San Francisco, has gone to Mexico.

Mr. F. Cogill has reached London on his return from Egypt.

Mr. Martin Schwerin, of New York, has returned from Mexico.

Capt. L. D. Phillips has moved from Prescott to Los Angeles.

Mr. Max Boehmer, of Denver, was recently at Butte, Mont.

Mr. Frank Peck, of Colorado Springs, is in New York at present.

Dr. George C. Munson has returned to Denver from De Lamar, Idaho.

Mr. E. R. Bush, of New York, is examining mines in Idaho and Colorado.

Mr. W. S. Ward, of Denver, is on a professional trip to Baker City, Ore.

Mr. Bernard MacDonald is back in Spokane after a trip to New York City.

Dr. F. J. Pope, of New York, is concluding examinations in Nova Scotia.

Mr. E. L. Godbe has returned to Salt Lake from Mohave, Kern County, Cal.

Mr. W. H. Wiley, of Idaho Springs, Colo., was at Los Angeles, Cal., recently.

Capt. J. D. Burgess, of Tucson, will be at Kelvin, Ariz., during July and August.

Mr. Franklin Farrel, of Ansonia, Conn., sailed by the steamer *Cedric* on July 17.

Mr. J. C. Buckbee, of the Allis-Chalmers Company, was at Salt Lake City recently.

Mr. L. C. Shaw, of Salt Lake City, has gone to Prince of Wales Island, Alaska.

Mr. Hal W. Hardinge sailed for London on the *Kaiser Wilhelm II.* on July 21.

Mr. George A. Benwell, Jr., of Denver, has gone on professional work to New Mexico.

Mr. L. A. Womble, of Berkeley, Cal., leaves shortly to accept a position in South Africa.

Mr. John A. Church, of New York, is at Globe, Ariz.; he will be absent until October.

Mr. Willis G. Dodd, president Union Iron Works, San Francisco, has been in New York.

Mr. L. A. Jeffs has resigned as superintendent of the Wolverine Mine at Park City, Utah.

Mr. R. N. Dickman, of Chicago, recently inspected the Gold Reef Mine at Gilt Edge, Mont.

Mr. L. Salmond, of Dunedin, New Zealand, is in New York, en route homeward from London.

Mr. F. Escher has resigned as manager of the American Mine at Terrazas, Chihuahua, Mex.

Mr. G. G. Kaeding, of San Francisco, has been examining properties in Siskiyou County, Cal.

Mr. C. Schiermeister, a mining engineer of Berlin, Germany, is visiting mining camps in Mexico.

Major B. C. Kingsbury is back in Spokane from a trip to the Lardeau County in British Columbia.

Mr. G. L. Keener, of Cripple Creek, Colo., has resigned as manager of the Mary McKinney Mine.

Mr. Clarence S. King, of San Francisco, goes to Denver, August 1, to engage in professional work.

Mr. R. S. Chase, of Boise, Ida., is in charge of the Queen of Sheba Mine and mill near Ibapah, Utah.

Mr. J. A. Shinn, of Denver, Colo., is examining mining property in Montana for Wisconsin people.

Mr. John C. Osgood, late head of the Colorado Fuel and Iron Company, was at Salt Lake City recently.

Mr. Spencer Cragoe has returned to London from Parral, Mex., and is now taking a well earned rest.

Mr. G. R. Hancock is vice-president and manager of the Comstock Mining Company, at Park City, Utah.

Mr. John B. Farish was in New York for two days last week, and has since departed for San Francisco.

Mr. V. B. Sherrod, of Salt Lake, has returned from an examination of mining properties near Guanajuato, Mex.

Mr. George B. Dennis, of Spokane, was recently at the Old Dominion Mine in Stevens County, Wash., on mining business.

Mr. W. W. White is superintendent of the Bonnie Mine near Prescott, Ariz., in place of Mr. J. J. Brooks, resigned.

Mr. A. K. Coomaraswamy has been appointed director and Mr. J. Parsons assistant of the Mineral Survey of Ceylon.

Mr. C. S. Cowan, of Anaconda, Mont., has gone to Salt Lake, where with George C. Westby he will open an assay office.

Mr. Heinrich Macco, of Siegen, German, arrives by the steamer *Barbarossa*, to visit the iron mines of the Lake Superior region.

Ex-Senator George Turner, of Spokane, has gone to London, where he will serve with the Alaskan boundary commission.

Prof. Arthur Lakes recently returned to Denver from Aspen, and is about to leave for Southern Arizona on mining business.

Mr. J. P. Empson has been appointed superintendent of the Reliance Gold Mining Company's cyanide mill near Deadwood, S. D.

Mr. Walter C. Orem, manager of the Utah-Apex Mine at Bingham, Utah, is spending a few weeks with his family in California.

Mr. John P. Marshall, formerly with the Carnegie Steel Company, has been investigating iron ore deposits in Cherokee County, Tex.

Mr. A. Burch, of Spokane, and former Governor Frank Steunenberg, of Idaho, have been at Atlanta, Idaho, examining the Tahoma Mine.

Mr. Archie Nevins, formerly of the Tomboy Mine, Telluride, Colo., who has been in Corea for the past year, has returned to San Francisco.

Mr. Irving J. Shields, of Hancock, Mich., has been appointed commissioner of the Michigan mines and mineral exhibit at the St. Louis Exposition.

Mr. Geo. W. Maynard, of New York, sailed on July 18 for Havana, by the steamer *Mexico*, to examine chrome iron deposits at Baracoa, Cuba.

Mr. Charles Doolittle has succeeded Mr. J. E. Beveridge as manager of the Utah and Eastern Copper Company, operating near St. George, Utah.

Mr. Fred Winkler, of Anaconda, Mont., is at Houghton, Mich. He will have charge of the erection of the New Michigan Smelting Company's furnace.

Mr. C. F. V. Jackson, assistant geologist on the Queensland Geological Survey staff, has been appointed to the same position on the West Australian staff.

Mr. S. F. Emmons, of the United States Geological Survey, sailed on July 21 by the *Kaiser Wilhelm II.* on his way to attend the Congress of Geologists, at Vienna.

Mr. G. Kartschocke, superintendent of the Delhi Mine, of the St. Gothard Mining Company, near Nevada City, Cal., has resigned and is succeeded by Mr. J. Eddie.

Mr. T. L. Nisson, formerly of Ontario, Canada, has succeeded Capt. L. D. Philippis as manager in Arizona for Douglas, Lacey & Co. Mr. Nisson will make Prescott his headquarters.

Mr. Walter E. Koch, of the Lustre Mining Company, Magistral, Durango, Mex., has been in New York, Chicago, Pittsburg, Kansas City and Denver, buying machinery for his company.

Much sympathy is expressed with Mr. Walter McDermott, who recently lost his father, the proprietor of the *Railway Times*, and one of the oldest newspaper proprietors in Great Britain.

Mr. N. Samwell has returned to London from the West Coast of Africa, where he has had charge of mining operations. Mr. Samwell has had special experience in Eastern Asia, and it is understood he intends to go thither shortly.

Mr. J. T. Marriner, recently of Kalgoorlie, is now in London. We understand Mr. Marriner has received a tempting offer to proceed to America, where his skill and success in the treatment of slimes by filter-pressing would be undoubtedly appreciated.

Mr. Warnford Lock is making good progress at the Raub Mine, Malay peninsula, and has initiated a plan for proving the value of the district in depth. Mr. Lock is an absolute convert to the value of Chinese labor, of which he writes enthusiastically.

Mr. Hennen Jennings, on his return to London from Johannesburg, has taken office as president of the Institution of Mining and Metallurgy; he is also on the committee of the great National School of Technical Education about to be founded in London.

Mr. W. R. Feldtmann, late in charge of the Bewick & Moreing interest in Western Australia, has proceeded to the Western Coast of Africa on account of the Tarbutt Consolidated Goldfields group. The decision of this group to employ the services of so well known an engineer will tend to increase the public estimation of West African ventures.

## OBITUARY.

William Garrett, inventor and well-known rolling mill engineer, died at Mt. Clemens, Mich., Wednesday, July 15, at the age of 59 years. Mr. Garrett was born in England in 1843, and began work in the rolling mills in Scotland when he was only 11 years old. At 16 he was operating a guide-mill. He came to this country in 1878 and for five years worked with the Cleveland Rolling Mill Company. In 1882 he brought out the first type of the Garrett mill, which was the first rod-mill in which a 4-in. billet was rolled into a 5-in. rod without reheating; his process also made possible the rolling of an ingot to a 4-in. billet without reheating. These improvements effected a saving at that time of about $7 per ton. About 80 per cent of the rods rolled in the United States at the present time are the product of Garrett mills. In 1883 Mr. Garrett went to Pittsburg and built the rod mill of the Oliver Wire Company's South Side plant; in 1886 he built a mill for the American Wire Company at Cleveland, and afterwards was connected with the Joliet Steel Company at Joliet, Ill., in a similar capacity. In 1897 he removed to Cleveland and established the Garrett-Cromwell Engineering Company, with H. W. Lash and John C. Cromwell as partners. Mr. Garrett contributed many articles on rolling mill practice to technical journals and engineering societies. He was a member of the leading engineering societies in this country and of the Iron and Steel Institute of Great Britain. He was well known throughout the country in the iron trade and to a wide circle of engineers and iron and steel manufacturers. The news of his death will bring a sharp sense of loss. His wife, a son and two daughters survive him.

Thomas Stuart Chalmers, founder of the firm of Fraser & Chalmers, was born on June 14, 1816, at Dronley, near Dundee, Scotland, and died in Chicago on July 13. Mr. Chalmers spent his youth at Dronley and went to school at Fowler, about four miles from there, walking to and from school each day. At 14 he went to learn his trade of machinist at Brown & Allen's, Dundee, manufacturers of spinning machinery. Mr. Chalmers served seven years as an apprentice and was paid half a crown, equal to 56c., a week from the beginning and raised a shilling a week every year, equal to about $2.12 per week at the end of the seven years. Then, as a journeyman machinist, he went to Fyfe, in Fyfeshire, Scotland, about 15 or 20 miles from Dundee, and worked for three years for Brown & Allen as an erecting machinist, putting up spinning and carding machines in mills. From Fyfe Mr. Chalmers went to Musselborough, a suburb of Edinburgh, where he had charge of a spinning mill for two years, and in 1840 he went back to Greenock, on the Clyde, where he worked for Caird & Company, marine and stationary engine builders.

Later he worked on the Glasgow & Greenock Railroad, at Greenock, in the machine shop, until he came to the United States, in 1843. He bought a farm near Lockport, Ill., but not liking farming, went to Chicago in 1844, then a city of 4,000 people, and went to work for P. W. Gates, who had a blacksmith shop located where now is the viaduct at Randolph street. Chalmers was associated with Gates until 1871.

When the Illinois & Michigan Canal was built he took the contract for all the iron work, all of the locks, aqueducts and bridges in 1847 for Mr. Gates, and about 1848 bought an old engine on the canal. This was the first engine put into the Gates works for doing by steam what he had previously done by horse power. The firm built many of the large mills in Michigan. In 1855 Mr. Chalmers became a member of the firm of Gates, Warner, Chalmers & Fraser, which in 1857 became the Eagle Works Manufacturing Company.

The firm of Fraser & Chalmers began business in 1872 at Fulton and Union streets, succeeding to the business of the Eagle Works Manufacturing Company, after P. W. Gates, president of that company, had decided to liquidate after the great fire. Fraser & Chalmers began work with 60 men on property 60 by 145 ft., and in 1901, when absorbed by the Allis-Chalmers Company, they were working 1,500 men in Chicago

and 1,000 at shops they had built in England, at Erith, Kent. Thomas Chalmers was a skilled mechanic of the old school, who having served an apprenticeship, received the balance of his education, both technical and commercial, by contact with the world and learning its requirements.

## SOCIETIES AND TECHNICAL SCHOOLS.

ENGINEERS' CLUB OF PHILADELPHIA.—The next meeting of the club will be on September 19. At the meeting on June 6 there were seventy-two members and visitors present. Mr. Henry G. Morris read a paper on "A Consideration of the Gaseous Fuel Problem." After tracing the history of the use of artificial gas from 1789, Mr. Morris took up the application of gas as fuel, including its use for domestic purposes. Some 40,000 gas stoves are now reported to be in use in Philadelphia. It is perhaps a safe assumption that 10 times as much fuel is required for heating and cooking as is required for lighting, so that there would appear to be a very large field of operations to be covered by the producer of gaseous fuel.

Development of the by-product coke ovens would seem to offer the solution of the problem of furnishing gaseous fuel at a low rate of cost, and methods of distribution to comparatively long distances make it possible to locate the producing plants at convenient geographical and commercial points. The bee hive ovens between Altoona and Pittsburg probably make 20,000 tons of coke per day, from which about 100,000,000 cu. ft. of gas discharge into the air. This gas, if converted into power through gas engines, would represent 5,000,000 h. p. hours, or the effort of about 104 gas engines of 2,000 h. p. each. Manufacturers of gas apparatus are now offering to guarantee the production of a h. p. hour for 1 lb. of fuel—a result not at present attainable through the medium of steam engines and boilers, except by the most complex type of engine. Mr. Morris exhibited and explained in a general way some slides showing a number of large plants for the manufacture of gas and coke. Among these was the large plant at Everett, Mass., which, properly speaking, is a coke and chemical works producing ammonia, coal tar and derivatives, the gas being considered a by-product.

A general discussion of the subject and the use of gas engines followed.

Messrs. F. T. Chambers, Charles C. Davis, Henry Hess, E. G. Marble, August A. Miller, Jno. W. Pollock, Peter Mullen and Lewis M. Pyle were elected to active membership, and F. K. Worley to associate membership.

## INDUSTRIAL.

The Cleveland-Cliffs Iron Company, of Cleveland, O., recently purchased another 225-acre tract at Toledo, O., thus giving it a frontage of 4,000 ft. on the Maumee River.

The Allis-Chalmers Company, of Chicago, recently received an order from the Consolidated Mining and Development Company, of Spokane, Wash., for a smelting plant costing $17,500.

The Dimmick Concentrating Company, of Denver, Colo., recently shipped a Dimmick classifier and several Wilfley tables to the El Cubo Mining and Milling Company, at Guanajuato, Mex.

The Trent Engineering and Machinery Company, of Salt Lake, has received an order for a 30-ton Chilean mill from the Newport & Nevada Gold Mining Company, of Lincoln County, Nev.

The Mine and Smelter Supply Company, of Denver, Colo., recently placed an order for 50 Wilfley tables with the St. Joseph Lead Company, of Missouri. At the Denver shops about three tables are manufactured daily.

The Shenango Iron and Steel Company, recently organized with $200,000 capital, will work the Continental Iron Works, at Whitehead, Pa. The directors are: Samuel McClure, D. Leet Wilson, A. W. Herron, of Pittsburg, and Mason Evans, of Youngstown.

The La Follette Coal, Iron and Railway Company, of La Follette, Tenn., blew in its furnace again July 10, after three weeks' idleness owing to the breaking down of its blowing engines. A new blowing engine and a hot-blast stove are being installed, to be ready by August 15.

The Ohio Valley Steel Foundry Company, of Pittsburg, Pa., was recently incorporated to manufacture and deal in steel and iron, with a capital of $150,000. The directors are: C. G. Robinson, Cincinnati; Thomas A. Watkins, George R. Wallace, J. B. McAdee and B. L. Hirschfield, of Pittsburg.

E. F. Du Brul, of Cincinnati, O., recently purchased about 500 acres of land and secured an option on 1,200 more in Jackson County, O., on which he intends erecting a 1,200-bbl. Portland cement plant. The land contains large deposits of limestone, shale and coal and is favorably situated as to transportation facilities.

The Cleveland Foundry Company, of Cleveland, O., through the Corlett Engineering Company, recently added electric equipment of Westinghouse manufacture, consisting of a 100-kw. 250-volt, engine-type generator, and 14 direct-current motors ranging from 5 to 30 h.p. capacity, together with the necessary switchboard and auxiliary apparatus.

The Cherry Valley Iron Company, of Pittsburg, Pa., is about to erect two new blast furnaces, one at West Middlesex, Pa., of 250 tons daily capacity, with a 17 by 70 ft. stack, and the other at Leetonia, O., with an 18½ by 80 ft. stack. The old stacks will be torn down when the new ones are completed. The contract for the iron work was given to the Ritter-Conley Manufacturing Company, of Pittsburg.

The National Engineering Company, of Buffalo, N. Y., has just opened offices at 214-216 Terrace, as engineers, agents and contractors, and will take up as engineers, the mechanical design of machinery, power plants, transmission systems, shops, mills, etc.; as agents they will take charge of installation work near Buffalo for other companies and make machine heavy castings; as contractors, the company will build and install power plants, shops, transmission systems, mills, etc.

The Trenton Iron Works Company, through its western manager, R. D. Seymour, has secured a contract from the San Juan Smelting and Refining Company, of Silverton, Colo., for the erection of an aerial tramway from the Henrietta Mine to the railroad on Cement Creek. The line will be 5,180 ft. long, will have 14 towers, and 26 buckets, the capacity being 15 tons per hour. The vertical difference in elevation of the upper and lower terminals is 831 ft. Later a mill is to be erected at the lower terminal.

## TRADE CATALOGUES.

A finely illustrated pamphlet of 34 pages, issued as Bulletin 35 by the Crocker-Wheeler Company, of Ampere, N. J., is entitled "The Equipment of a Railway Shop" and contains a description of the power and electrical equipment of the new locomotive and car shops of the Lake Shore & Michigan Southern Railway, at Collinwood, Ohio. The motors used on the various tools, in order to obtain variable speed, employ the multiple-voltage system, which consists essentially of several sources of current supply, differing in voltage, which may be fed to the motor separately or in combination.

The National Oil Burner and Equipment Company, of St. Louis, Mo., issues a 24-page pamphlet, describing the Branch furnace burners and oil heaters for using fuel oil in boiler and other furnaces. The company states that its system burns oil without waste, is entirely automatic and is very simple. The entire apparatus weighs only 350 lbs. and occupies a floor space of only 3 sq. ft. The burners differ from others in that they are on the outside of the furnace, the steam or air and oil being superheated in the burners. The company also makes burners for domestic purposes and for welding and heating furnaces. The pamphlet contains information on the properties of crude oil and a table showing the calorific power of various fuels.

The Frank S. De Ronde Company, 46 Cliff street, New York City, has just issued a catalogue, handsomely illustrated, setting forth the advantages of Ruberoid roofing and other specialties for which it is export agent. The company claims that Ruberoid roofing is particularly adapted for use in Mexico, Cuba, Puerto Rico, South and Central America, where tile roofing is now generally used. Ruberoid roofing is said to be light in weight and easily put on by stretching wire netting over the rafters. Ruberoid is said to last for years and is guaranteed to keep a roof perfectly tight. It is free from tar and odorless. It is claimed that Ruberoid is preferable to tin, steel, iron or any kind of metal, because it does not decay and needs no paint or repairing. A catalogue is printed in Spanish for distribution in the Latin countries.

The Burnham independent air pump and jet condenser and the Burnham direct acting steam pump are described in a pamphlet published by the Union Steam Pump Company, of Battle Creek, Mich. The Burnham condenser, made in 26 different sizes, is described as a compact and strong machine. It relieves the main engine of the drag of a connected air pump, while the complication of such parts as rocking-arms, links, journals, keys, connecting-rods, slides, crossheads, etc., is done away with. The distribution of the injector water is such that the steam is condensed with the least possible amount of water. The pumps are fitted with Tobin bronze piston rods, brass valve seats and bolts and rubber valves. The pamphlet gives considerable special information about the condenser. The company states that it makes over 400 sizes and styles of steam pumps for all duties.

The Denver Fire Clay Company, of Denver, Colo., publishes a substantially bound pamphlet of 312 pages, this being the ninth edition of its catalogue. The catalogue is divided into five parts. Part 1 describes a very full line of chemists and assayers, laboratory supplies, including the balances made by William Ainsworth & Sons; also Troemner, Becker and Smith & Thompson balances. Of assay furnaces the company manufactures special-design coal and wood-burning muffle furnaces; also the Bosworth, the Brown and the Burro furnaces, which use coke or charcoal, and carries in stock the Hoskins, Fletcher and Carey furnaces for liquid fuel. Part 2 of the pamphlet treats of special chemical apparatus for gas analysis, electrolytic work, etc. Part 3 describes special outfits for prospectors and assayers or for technical school use. Part 4 describes the fire brick, tile and fire clay material, including cylinder linings, furnace shapes, etc., made by the company. Part 5 is a price list of the chemicals and reagents the company carries in stock.

## SPECIAL CORRESPONDENCE.

**Denver.** July 18.

*(From Our Special Correspondent.)*

The mining sensation of the past week in Colorado is a reported discovery of high grade, free milling gold ore near Waunita Springs, in the Eastern part of Gunnison County. A large number of prospectors and others have rushed into the district. Nothing has yet been disclosed to justify a stampede.

The strike recently declared at the Standard Mill, at Colorado City, of the United States Reduction and Refining Company, by the local Mill Men's Union and the Western Federation of Miners, so far has proved a fiasco, as only 11 men left work in consequence. The plant is not unionized, the employes to the number of about 150 are mostly non-union, and the mill continues in full operation. It is regarded as unlikely that the Miner's Unions in the Cripple Creek District can be induced to strike in sympathy with the Colorado City mill men. Because of the declining average value of the ore now being mined in the Cripple Creek District, a general miner's strike there would probably result in a reduction of the local wage scale.

The strike situation at the Denver Smelters of the American Smelting and Refining Company remains practically the same. Active preparations are being made for resumption at the Globe plant, while necessary repairs are proceeding at the Grant plant. Meanwhile, agents of the Western Federation of Miners have been trying hard to bring about similar strikes at the other Colorado smelters of the company at Pueblo, Leadville and Durango, the only result, so far, being the organization of those places of strong Citizens' Alliances.

In the new Móffat railroad 2,900 men are at work on one length of 10 miles, containing numerous tunnels, which are all expected to be finished in September. Track laying is starting on the first stretch of 20 miles to Coal Creek in the foot hills. It is expected that the railroad will reach Rollinsville in Northern Gilpin County, 42 miles from Denver, by November, and that trains will be actually running early in December. Bids are in for the main tunnel through the Continental Divide, expected to cost $1,000,000, and surveying parties west of the Continental Divide are making rapid progress in locating the right of way through Grand and Routt counties.

The Big Kanawha Mining Company, operating at Creede, Mineral County, claims it is employing 160 men, and milling 200 tons of ore per day, producing 40 tons of lead concentrates, averaging 1¼ oz. gold and 10 oz. silver per ton, and 70 per cent lead, besides 10 tons of zinc concentrates, carrying 48 per cent. with some silver and gold. The zinc concentrates are shipped to the plant of the Empire Zinc Company, at Iola, Kans. The Del Monte Leasing Company, having the same stockholders and officers as the Big Kanawha Mining Company, is operating the Del Monte and New York-Chance Mines at Creede, and is shipping 100 tons of crude ore per day, carrying 40 oz. silver per ton, with small amounts of gold and lead. Both the above companies are looking for miners.

**San Francisco.** July 15.

*(From Our Special Correspondent.)*

Two sections of the State are now troubled with miners' union strikes—Randburg, Kern County, and Stent, Tuolumne County. At the former place many mines have been closed some time, and there seems to be no prospect of a settlement. The trouble at Stent is more recent, and affects the Jumper, Golden Rule, Santa Ysabel and one or two other mines.

The Board of Supervisors of Sacramento County has taken a hand in the crusade against hydraulic mining, being led thereto doubtless by the efforts and influence of the Anti-Debris Association. It has adopted resolutions to the effect that certain persons unknown are mining by the hydraulic process at Gold Run, Placer County, and unlawfully allowing tailings to run into the American River and tributaries, whence they find their way into the Sacramento River

to its detriment and damage; and have instructed the District Attorney to begin suit against all parties who are mining by hydraulic process or by ground sluicing. There was never any law against ground sluicing, and the legislature on March 24, 1892, amended the civil code as follows: "The business of hydraulic mining may be carried on within the State, wherever and whenever the same can be carried on without material injury to the navigable streams, or the lands adjacent thereto."—"Hydraulic mining, within the meaning of this title, is mining by means of the application of water, under pressure, through a nozzle, against a natural bank."

The miner in ground sluicing uses no nozzle and no water under pressure. An enforcement of the hydraulic mining law against ordinary placer miners would work great hardship over a wide area. The plows in the Sacramento Valley loosen each winter vastly more soil and earth than all the ground sluice miners in the State. If, however, there are hydraulic miners operating illegally, and dumping their debris into streams which convey it to navigable rivers, the Sacramento supervisors are perfectly right in seeking a punishment. If the anti-debris people try to persecute miners who have legal permits to mine, and whose mines are under the supervision of the engineers of the California Debris Commission, that is another thing.

The long standing litigation over the ownership of the lithia mica mines at Pala, San Diego County, has been settled by a decision of the court that Stewart had not established a legal claim to the property, having done no assessment work. The property will now pass into the hands of the American Lithia and Chemical Company, recently organized.

The Los Angeles Stock Exchange has voted against the proposed merger with the Miners' Stock Exchange of that city, and the two exchanges will continue to do business separately until one of them quits, as there is not enough business for two.

Advices from Bakersfield are that the oil through the Standard Oil Company's long pipe line will arrive at Point Richmond, on San Francisco Bay, on July 20, and the capacity will be 10,000 bbls. per day. Only four more pumping stations than those originally designed are supposed to be required, instead of an entire double set. There is a great demand for light grade oils, and all the operators are striving to increase the product.

The Northwestern Commercial Company is shipping 23,000 bbls. of California oil to St. Michael, Alaska, to be used on its steamboats on the Yukon River in place of wood. Oil stations will be established along the river from the lowest point up to Dawson, Yukon Territory. The company's river boats have been converted to oil burners. Wood near the stations along the river is getting scarce. The coal on the upper river is hard to mine and costs considerable to distribute along the 2,000 miles of a river open four or five months of the year.

The Kern Trading and Oil Company has started to acquire some large properties in this State, and has already all the stock in the San Joaquin Oil Company, the Reed Crude Oil Company, and others. It is composed of officials of the Southern Pacific Company, and will in the future be responsible for the railroad company's fuel supply. The Southern Pacific owns many wells in California and Texas, all of which will be turned over to the new corporation, and more wells will be bought. Out of a total of 1,300 locomotives in use on its Atlantic and Pacific systems, 700 are now burning oil as fuel, and others are being converted.

The "gusher" oil well at Santa Maria, Santa Barbara County, has been capped, and a pipe line is being put in to carry the product to Graciosa, whence it may be shipped by rail. The regular capacity is now estimated at 2,000 bbls. per day.

There is only one rock asphalt mine now worked in this State, all others having closed, as so much asphalt is made by the oil refineries from oil having an asphalt base.

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**Spokane.** July 17.

*(From Our Special Correspondent.)*

The Coeur d'Alene mine owners will hold a conference in September in New York with the American Smelting and Refining Company, to fix contracts for handling ores during the coming year. They are now getting better terms than ever, but feel they are entitled to still lower rates, and they will doubtless make demands for reductions. The mines are working to their capacity, employing, it is estimated, 2,200 men, the most ever known. Labor difficulties are quiescent, thanks to the employment bureau system. When a miner wants work, he does not apply to the shift boss on the ground, but to the employment agent at Wallace. He leaves his name there, and the agent fills requisitions from the shift bosses at the mines, by sending such men as he thinks are law-abiding.

The Wetern Federation of Miners still has organizations in the Coeur d'Alenes, but they are not important factors. The Wardner Industrial Union, formed just after the riots of 1899, is still flourishing.

The Spokane interests which manage the Fisher-Maiden-Troy Mining Company operating in the Slocan, B. C., are urging the reorganization of the company on an assessable basis to provide a working capital to complete a road to the mine and finish a lower tunnel. The mine shipped 13 carloads of ore over snow roads during the past winter, that netted $500 a car.

The Old Dominion, in Stevens County, the pioneer mine of Eastern Washington, is worked under lease by Minneapolis men. The concentrator has started. Some good ore has been met in the winze from the 600 ft. level. The mine has shipped at intervals to the Tacoma Smelter during the year.

The Washington commission having charge of the display which the state will make at the St. Louis fair expects to lay stress upon the marble industry of Stevens County, and the erection of a marble stairway in the Washington building is seriously discussed.

The Wundrum Mine in Cave Gulch, on the Snake River, above Lewiston, Idaho, which created considerable excitement this year, when discovered, is shipping a test car of high grade ore to the Tacoma Smelter. The railway company has not fixed a rate for transportation, but has agreed to make it low enough to encourage shipments.

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**Tonopah, Nev.** July 15.

*(From Our Special Correspondent.)*

The Montana Tonopah, adjoining the Tonopah Mining Company's property on the north and the General Thomas Mine at Lone Mountain, 14 miles southwest of Tonopah, have begun shipments. In the Tonopah Mining Company's ground the diamond drill has struck the Mizpah ledge at 825 ft., and drilling will continue. The company is shipping about 600 tons of ore per month, said to cover all working expenses (about $50,000 per month), surface improvements and contingencies.

The Belmont Development Company, owning 11 claims and a tunnel site east of the Tonopah Mining Company's ground, will ship its first ore this week. Sinking the shaft 1,700 ft. east of the present ore body is pushed as rapidly as possible.

The Montana Tonopah Mining Company is drifting at 512 ft. on a ledge, 2 ft. of which is said to assay from $2,000 to $4,000 per ton. The first shipment of one car-load (25 tons) of first and second-grade ore netted $9,127. The second and third car-loads have left the mine. No ore has been stoped.

The proposed consolidation of the Gold Hill, Fraction, Tonopah City and Tonopah-Salt Lake properties has not yet been effected, owing to difficulties in making terms with the owners of the Tonopah-Salt Lake. In the meantime work has been discontinued.

The General Thomas Mine, at Lone Mountain, which changed owners on June 15, has since shipped over 80 tons of ore netting $36 per ton. The mine was located 20 years ago, when 60 ft. of work was done. The country rock is limestone, and the ore, from 14 ins. to 6 ft. wide, is a "sand carbonate" of lead. The present cost of production is: Hauling to Sodaville, $8 per ton; rail from Sodaville to Salt Lake City and smelter charges, $6.75; mining, sorting, sacking and weighing, $5.75 per ton; total, $20.50.

Water is being developed in considerable quantities at Rye Patch, 16 miles north of Tonopah, where one company is pumping 70,000 gals. per day. In some of the claims near Tonopah also water is found. The Halifax, on the east, has 2,500 gals. per day at a depth of 600 ft.; the Rescue, southeast, 8,000 gals. per day at 300 ft.; the Gold Hill, 2,000 gals. per day at 500 ft. On the west of the Tonopah Mining Company's ground, the Golden Anchor, Silver Top and Tonopah Belle have all struck water.

The promoters of the projected railway from Rhodes to Tonopah state that the bonds have been fully subscribed, that construction will commence at once and the railway will be in Tonopah in December.

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**Victoria, B. C.** July 14.

*(From Our Special Correspondent.)*

The report for the year ending May 31 of the North Star Mining Company, operating a silver-lead mine at Kimberley, East Kootenay, states that development work has not resulted in the disclosure of any large additional ore bodies, "although indications are very encouraging." A dividend was paid for the quarter ending August 31, but on December last the directors decided that it was in the interests of the shareholders to suspend payment of further dividends in order to keep the company in a strong financial position and enable them to continue development work to depth and ensure the full exploration of the property. The total amount of development work done during the year amounted to 12,166 feet of drifting, cross-cutting, sinking, raising and diamond drilling. The work, it is stated, from now on will be more confined and not so scattered as last year. During the year 3,426 tons of ore were shipped, the assay value of which averaged 29.5 oz. silver, and 36.2 per cent lead. The accounts show a credit balance of $70,457.55, of which $21,960 represents profit on proceeds of ore sales and miscellaneous receipts.

While the anticipations of an exceptionally large output from Boundary District this year have been so far somewhat disappointed, as a result of unforeseen and uncontrollable outside industrial conditions, yet the aggregate production for six months of 274,000 tons is far from unsatisfactory, easily exceeding as it does the half of the 1902 shipments. Of the productive mines, the Granby have contributed the largest relative tonnage, partly, it may be explained, on the grounds that the company succeeded in securing a fuel supply from other sources than the Crow's Nest at the time of the Fernie labor troubles. The total tonnage of these mines in 1902, was 310,000 tons in round numbers, and up to June 30, the tonnage this year is about 164,000. The Mother Lode Mine has fallen short on account of the smelter being idle. Last year's tonnage was about 140,000, and for the half year just closed about 50,000. Of course, with a reasonable show, the difference can be easily overcome, and the tonnage far exceeded before the close of the year. The Sunset Mine has more than equalled half of last year's tonnage; the Snowshoe in the half year has exceeded by 6,000 tons its entire output for 1902, and the B. C. Mine has just equalled its output for last year. The small tonnage from the Sunset and the shortage in Mother Lode shipments is accounted for by reason of the fact that both the B. C. Mine and the Snowshoe have largely increased their tonnage. These ores have been treated at the Sunset and B. C. Copper Company's smelters, and in the absence of an adequate supply of coke, the shipments from the companies' own mines were necessarily curtailed. The Emma Mine has also in the half year exceeded by 2,000 tons last year's total shipments. In addition the high grade mines near Greenwood shipped about 800 tons in six months. Meanwhile the Boundary is rich in expectations for the next six months. The Crow's Nest Pass Company expect to be able to meet the requirements of the smelters as soon as the Morrissey coke ovens are ready. Coke is coming in a little more freely even now. The Granby people have secured a large shipment of coke from Fairfax, Washington; three furnaces are now running; a fourth will be blown in next week, and two additional furnaces will be ready in a few weeks. This will give six furnaces in all, with a capacity of 2,300 tons daily. The Montreal & Boston Company will blow in the second furnace next week, and the third will soon be here, and the B. C. Copper Company has its two furnaces running. The capacity of all these furnaces is about 3,500 tons daily, which if running full blast for six months would treat over 600,000 in that time. But shortage of coke, further labor troubles, accidents, and other causes may intervene to keep the output down. In any case it is safe to state that the total this year will show a healthy increase over last year.

The high grade mines near Greenwood continue, furthermore, to make a wonderfully good showing, the last returns on a carload of ore sent from the Providence to the Trail Smelter giving the extraordinary valuation of $225 per ton, or gold, 1.92 oz.; silver, 373.6 oz.; and lead, 6.8 per cent. A clean-up at the Waterloo, Camp McKinney, is said to have produced a profit of $7,500, and it is expected that the July return will be from $8,000 to $10,000.

A rich strike of copper-gold ore is reported to have been made near Nelson, on Eagle Creek, a lead 16 ft. in width having been uncovered on the Central Claim, from which assays of $33.50 were obtained.

Shipments from Rossland now aggregate approximately 190,000 tons, and as the output from Le Roi is to be increased in the near future, and a number of new mines will shortly join in the productive class, it is not unreasonably hoped that the 1903 record will not fall short of 400,000 tons. The past week has been comparatively uneventful, the chief items of interest being the commencement of shipping operations by the Jumbo, increased activity at the Spitzee, whose new machinery has been installed and a first shipment of concentrates from the silica works.

Much disappointment is expressed at the suspension of operations by the Cariboo Gold Fields Company, one of the most important undertakings in the Barkerville District. It is hoped, however, that this is merely a temporary expedient. Meanwhile the test borings have been completed on the Cariboo Consolidated Company's La Fontaine property, Lightning Creek, and preparations are now being made to sink a three-compartment shaft to bedrock. Bedrock is found to be 120 ft. below the present creek level, which is considerably less than half the depth of Slough Creek. Good progress has been made since the inception of the work, and now that all the machinery is on the ground, it is hoped that Mr. Bailey will strike bedrock within the time he estimated. The main shaft house will be about 40 by 100 ft.; boiler room, 25 by 40 ft., and machine shop, storeroom, etc., about the size of the boiler room.

Considerable satisfaction is expressed in the Slocan and in East Kootenay, at the announcement of the

Dominion Government's decision in respect to affording the silver-lead mining industry in British Columbia much needed assistance, in the form of a bonus of 75 cents on every 100 lbs. of lead smelted in the country up to a maximum annual amount of 33,000 tons. The aggregate sum thus to be appropriated is $2,500,000, from which distributions of $500,000 will be made annually for a period of 5 years

At last the long drawn-out trouble between Mr. Dunsmuir and his employees at the Ladysmith collieries has been adjusted, and by a vote of 168 to 117 the men this week returned to work. A settlement was all but arranged two weeks since, negotiations being, however, broken off at the last moment on very inadequate grounds. Four months have elapsed since the mines were closed, the loss to the country, to the mine owners, and to the miners themselves amounting to a very respectable sum. The resumption of operations means the discomfiture of the Western Federation of Miners, and in consequence it is not unlikely that the influence of this organization in Western Canada will be largely destroyed. In the present instance it is certain the Federation failed to afford the Ladysmith workers the support and pecuniary assistance they had been led to expect, while only the other day the East Kootenay coal miners severed their connection with the Federation on very similar grounds.

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**London.** July 11.

*(From Our Special Correspondent.)*

The present position of the Tyee Copper Company, Limited, which owns the well-known properties on Mount Sicker, Vancouver Island, is an extremely encouraging one and the company may now be said to have established itself on a prosperous basis. The mine has had a hard fight, and a less enthusiastic man than Mr. Clermont Livingston might have given up in despair. It was first introduced to the English public in 1898 by Mr. Nicol Brown, and it was the victim of a rash experiment in the way of flotation. Mr. Nicol Brown held that, if the public were given full information about a mine and were taken into the confidence of the promoters and directors, there would be no difficulty in placing the shares without underwriting but solely by advertising the prospectus. Mr. Nicol Brown is admittedly a competent authority on copper and he enjoys the esteem of the city as a business man of ability and integrity. But his scheme fell through and the Tyee mine suffered in consequence. In 1900 the mine was again introduced to the English public by the present Tyee Copper Company, and this time the flotation was successful. At first the ores were shipped to Tacoma, but it was soon found that this was not an economical way of working. In fact, the average grade of the ore did not admit of shipping in bulk. It is true that in parts the ore had high enough contents to make shipment profitable, but such a policy would have been shortsighted. It was decided, therefore, to raise further capital for the construction of a smelter. This is now in operation, and is working with extremely satisfactory results. The ore-bodies are somewhat tortuous and irregular, and are difficult to block out and estimate. The mine manager, Mr. Musgrave, wisely makes no attempt to do so, as it would entail much extra work. He accordingly refrains from figuring on "ore exposed" or "ore blocked out," but contents himself with the expression "probable ore," of which he considers there may be nearly 100,000 tons. At the meeting of shareholders held the other day Mr. Pellew Harvey, who originally reported on the mine for the present company, stated that he considered Mr. Musgrave's estimate as decidedly conservative, as at his recent visit to the mine he had made an estimate that was higher. The average extraction at the smelter is 3.63 per cent copper, 2.57 oz. silver, and 2.56 dwts. gold per ton. A matte averaging 42 per cent of copper is produced. About 4,000 tons of ore are treated a month and at the present time the monthly profits are £6,000, though of course there is an expectation that the profits will increase when copper recovers. Altogether the company and the property are well managed, and shareholders may confidently look forward to continuous dividends.

The Elmore oil concentration process has not hitherto been tried in South Africa, but arrangements have now been completed for the sale of the South African patents to a syndicate formed by the two firms, S. Neumann & Co. and Wernher, Beit & Co. The latter firm already owns a quarter interest in the patents of all the world. A complete plant is being sent out to Rhodesia, where experiments will be made on copper ores and on low grade refractory gold ores.

The Panuco copper mine in Mexico has at last been disposed of by the official liquidator in bankruptcy, and the sum obtained is only £500. This compares badly with the price, £375,000, at which it was sold to the Panuco Copper Company a few years ago. The buyer at £500 is Mr. Hugh McDonnell, of Detroit, who originally, along with Judge Cleary, sold it to the Englishmen who brought it over here. I wonder what he is going to do with it this time? Sell it to somebody who is unacquainted with its history? It is hardly possible that he is going to operate it himself, as the mine has been condemned by examination and by the results of actual working time after time.

The report for the past year of the Mond Nickel Company, which operates mines and smelters at Sudbury, Ontario, and the nickel-carbonyl refining process in South Wales, shows that in spite of many serious obstacles the company is progressing satisfactorily. It is true that there are no divisible profits and that money is still being spent on capital account in exploring and development work at the mines, but the general position of things and the prospects are favorable. The smelters at Sudbury are doing excellent work and under Mr. Hixon's direction many important economies have already been effected. The refining works at Swansea still cause trouble, owing to the mysterious illness that has attacked the workmen. The plant has been remodeled in such a way that the gaseous nickel-carbonyl shall not be allowed to escape, for although the medical men that have been called in to study the cause of the illness have made no definite statement, it can hardly be from any other cause that the disease arises. In any case, the results of the prevention of the escape of the gas will go far towards settling the question. Dr. Ludwig Mond has very liberally come forward and paid the whole of the accrued dividend on the preferred shares, as a free gift not to be repaid. At the time of the flotation of the company he had no idea that profits would be so long delayed, and of course could not foresee the troubles that have cropped up.

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**Perth, W. A.** June 5.

*(From Our Special Correspondent.)*

The North Kalgurli reports good grade ore being broken from the workings at the 110-ft., 175-ft. and 275-ft. levels of their lease. Some of it is very rich, and a 100-ton lot is going to the Fremantle Smelting Company for treatment. The erection of the new mill is pushed.

At the Lake View Consols some time has elapsed since the Elmore oil concentration process was installed, but the plan is still in the trial stage. It is announced that bulk working tests will start in a week. Many processes have been tried on this field, and many proved failures. The Elmore process is certainly suited for some sulphide ores, but possibly the cost of oil in Kalgoorlie may upset the calculations of the patentees.

The Associated Northern has its main shaft nearly deep enough to intersect the first of the deep telluride shoots cut by the diamond drill. The best ore cut by the drill was about 200 ft. below present level. Until the erection of the new Treatment plant regular shipments of high smelting ore are sent to the Dapto works. General regret is felt at the sudden death of Capt. Rodda, who was much liked and respected.

*Menzies.*—The Queensland Menzies Mine is looking exceedingly well. Ore broken in the winze is very high-grade, showing free gold. The reefs, solid bodies of quartz, are in some parts 12 ft. wide.

*Northwest Districts.*—These fields are gradually attracting attention. The Government is taking steps toward the construction of the Port Hedland & Marble Bar Railway, much needed. This line will give an immense impetus fo this vast mineral country.

The Lalla Rookh Mine reports having struck a reef 30 ft. thick, but value is not yet known. A parcel of stone, 25 tons, from the Uncle Tom Mine, has yielded 102 oz. of gold.

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**Sydney, N. S. W.** June 12.

*(From Our Special Correspondent.)*

*New South Wales.*—The yield of gold won in this State for the month of May was 9,398 oz. fine and for the five months of this year 73,346 oz. fine.

An alluvial gold find has recently been made in the bed of the Hunter River, near Denman, from which some good specimens of water-worn gold have been washed.

Very rich gold is being raised from Hogan's claim, at Tucker's Hill, and at Cassidy's reef better gold is showing than ever. The Big Nugget reef has been purchased by a London company, and operations will be started soon.

Mr. H. W. Newman has been appointed superintendent of the Aladdin Company's property at Lucknow. The whole of the mines are now under his control. The Australian Gold Recovery Company has purchased the Aladdin and Wentworth companies' tailings dumps, estimated to contain 60,000 tons, for the sum of £10,000, and preparations have been commenced for their treatment. It is expected that it will take two years to treat all these residues.

A deposit has been paid on the purchase money of the Great Cobar copper mine, which is under offer for the sum of £1,150,000 to an English syndicate.

The Crowl Creek copper mine, in the Nymagee district, continues to develop in a satisfactory manner. A few men have been put on to work the Shuttleton mine adjoining, which was recently floated.

The management of the Central Mine, Broken Hill, has decided to abandon the idea of utilizing the new Extended shaft, and instead will sink an entirely new shaft on the eastern or foot-wall side of the ore body. Crosscuts have been started eastwards in connection therewith.

The Conrad Consolidated Mine at Howell is now running full time, and smelting operations are being satisfactorily carried on, the product being copper matte and tin-lead bullion. The ore consists of sulphides of copper, tin, lead and silver. The ore is concentrated to contain about 110 oz. silver, 40 to 45 per cent lead, 3½ per cent copper and 3 to 5 per cent tin, which silver-lead concentrates are sold as such; while the copper-silver-tin concentrates are smelted in reverberatories to a coarse matte containing about 35 per cent copper, 200 oz. silver, 20 per cent lead and 2 per cent tin. This is later brought up to 60 to 65 per cent copper, 320 oz. silver, while the lead is reduced to 10 per cent and the tin to 1 per cent. The lead and tin is recovered from the slag in the form of tin-lead bullion containing say 55 per cent tin and 43 per cent lead, together with 50 oz. silver per ton.

The molybdenite mines at Kingsgate are yielding very good results. One mine is reported to be turning out one ton of the mineral per week. Some promising finds of the same mineral are being developed at Deepwater.

*Queensland.*—The Gympie gold yield for May was 23,489 oz., which is a record for the field for one month. The dividends totalled £40,900. Compared with that of last year the past five months show an increase of 20,855 oz. in the gold yield, £29,798 in dividends, and a decrease of £4,297 in calls. The West of Scotland mine has cut the hanging wall of the reef in the crosscut at the 2,918-ft. level. This is a most important development, as the West of Scotland is the deepest mine in Queensland. Should a good payable reef be cut at this depth it would mean a new life to Gympie, as the company's lease is considerably to the east of any known payable stone.

The Politician Mine at Ravenswood has declared a dividend, which is the first dividend paid on this field, now over 30 years old, by a colonial-owned company. The rich English-owned Sunset Mine has paid dividends, and also some Donnybrook syndicates, but up to the present no local companies. It is not improbable that before long several mines will be on the dividend-paying list.

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**Auckland, N. Z.** June 5.

*(From Our Special Correspondent.)*

*State Coal Mine.*—Development work on the State coal mine, near Greymouth, is proceeding. It is expected that coal will be placed on the market about the end of the year. The avowed object of this enterprise is to reduce the retail price of coal to the small consumer, the idea being that if the State mine sells at a reduced rate private companies will be compelled to follow suit. The result of this rather daring experiment in State Socialism will be watched with interest.

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## GENERAL MINING NEWS.

### ARIZONA.

#### GRAHAM COUNTY.

*Arizona Copper Company, Limited.*—The directors, at their meeting recently, had before them the results for the half-year to March 31, 1903. Subject to final adjustment the free profits, including £15,860 brought forward from September 30, 1902, amounted to £164,445; the dividends for the half year on the "A" preference shares and the 7 per cent preference stock amount to £12,266, leaving a sum of £152,179. Out of this sum the directors have resolved to pay, on July 24, an interim dividend of 5s. 6d. per share, free of tax, on the preferred ordinary and deferred ordinary shares, absorbing £104,493. This will leave a balance of £47,686, from which will fall to be deducted a sum to be set aside for the redemption of debt and contingencies.

#### COCHISE COUNTY.

*(From Our Special Correspondent.)*

*Golden Era Mining Company.*—This company, with mines and works near Bisbee, will soon have a 10-stamp mill in operation, water to be obtained from the mine. Air compressors are also to be installed.

*Martinez Gold Mining Company.*—Work on this company's property, in the Yellowstone District, near Benson, is confined chiefly to driving a tunnel on the Amale No. 1 to cut the ledge at a depth of nearly 300 ft. The tunnel is in about 170 ft. Developments in an upper level show that the vein is 2 ft. wide, with values running $60 per ton.

*Rider.*—This group of copper claims near Douglas has been sold to E. C. Bartlett, of Dillon, Mont., by the Chiricahua Development Company. There is a copper showing in one shaft at a depth of 50 ft. as-

saying nearly 20 per cent, with some gold and silver. The new management will install a new hoisting plant.

*Twilight.*—A new steam hoisting plant is nearly ready for work on this mine near Bisbee. Sinking the shaft through the lime capping overlying the ore bodies will be continued.

GILA COUNTY.

*Old Dominion.*—The new shaft has been sunk to 257 ft. and foundation for a new smelter laid. About 250 ment are employed. The company is expending about $50,000 on the property in improvements, and is building about two miles of railroad tracks on the smelter site.

MOHAVE COUNTY.

(*From Our Special Correspondent.*)

*Altata.*—This mine, at Chloride, is under lease to A. H. Dryden and John Schemmelpfenig. At the 75-ft. level, from which ore for the past few months has been taken, the vein has widened to nearly 30 in., with increased gold and copper values.

*Earl.*—This mine, at Stockton Hill, is making an output of 4 carloads a month of ore that will average $100 a ton. Developments are centered in the breast of the 800-ft. tunnel, being driven under the mountain, and work is being prosecuted at a vertical depth of more than 1,000 ft. Values in gold and silver have somewhat fallen off in driving the last 50 ft., but the value in copper has increased.

*Gold Road.*—This rich gold mine at Acme had its first clean-up of about 200 tons of ore by cyanide treatment a few days ago, yielding 383 oz. fine gold. The company called for 50 additinal miners to break ore under a contract of $2.25 a ton, and at this time there are nearly 300 men employed about the mill and mine. The 300-ton mill is only handling about 150 tons each 24 hours at present, but with the system of work this tonnage will almost be doubled.

*Paymaster.*—The shaft on this mine, on Sheridan's Peak, is down almost 200 ft. This property is owned and operated by the Hoffman brothers, who recently purchased it from Thomas McNeely, of Mineral Park. L. Hoffman is superintendent, with headquarters at Chloride.

*Pilgrim.*—The Dempsey & O'Dea gold discovery, on the West side of the Sacramento Valley, 9 miles west of Chloride, has been sold during the week. The French company operating the new mill and Gold Road Mine, 25 miles west of Kingman is the purchaser, and will at once begin operating the mine on an extensive scale.

*Silver Age.*—A crosscut from the 250-ft. level has cut a body of ore 2 ft. in width and assaying 262 oz. to the ton. F. W. Theis is the owner of the property.

## CALIFORNIA.

AMADOR COUNTY.

*South Eureka Mining Company.*—The ore from this mine at Sutter Creek, John Truscott superintendent, is reported to yield a net profit of $2 per ton.

CALAVERAS COUNTY.

*Bully Boy.*—Two shifts are sinking a shaft to bedrock on this gravel mine, near Angels. The gravel prospects encouragingly.

*Emma.*—Some rich ore has recently been struck in this mine, near Campo Seco, H. J. McSorley, superintendent.

*Lloyd.*—The Ophir Mining Company, Frank Heath superintendent, which is working this mine at Central Hill, is putting in machinery, and will erect a 5-stamp mill at once. The 165 ft. incline will be extended 200 ft. to tap the grand channel.

*Western Mining Company.*—At this mine, in Rich Gulch, Superintendent Thos. Kavanaugh is working 11 men. New buildings are being put up, and considerable machinery is on the ground, including a 5-drill compressor plant, 3 Leyner drills, diamond drill plant, piping, etc. The stamps for a 20-stamp mill are also provided. Part of the property was known as the Foote and Thompson Claim. The veins are first to be exposed by surface washing.

*San Domingo Gold Mining Company.*—At this mine, near Angels, Beach Thompson, manager, the 1,100 ft. tunnel now completed strikes 20 ft. below the gravel channel.

EL DORADO COUNTY.

*Mount Pleasant.*—In this mine at Grizzly Flat, Wm. Brown superintendent, the water has been lowered below the 500-ft. level, and a drift is to be run south.

*Vandalia.*—At this mine at Canyon, owned by John Rosenfeld's Sons, of San Francisco, W. D. Mulloy superintendent, a new tunnel is being run under the old workings.

HUMBOLDT COUNTY.

*Gold Bluff Mining Company.*—The Bank of Arcata has placed an attachment on this property at Gold Bluff, consisting of the Union Gold Bluff Placer, Chester Consolidated Placer, and Arcata Consolidated Placer. The stockholders and directors disagree. A. D. Munson, who was replaced as manager not long since by L. F. Puter, is again in charge.

INYO COUNTY.

*Creed Mining Company.*—This company, in the Ballarat region, is preparing to put up a mill.

*Indian Queen.*—The Western Ore Purchasing Company has bought 1,500 tons of ore from this mine.

MADERA COUNTY.

*Josephine Extension.*—C. M. Ward & Co. have opened up this extension claim at Grub Gulch, and are finding some good ore.

MONO COUNTY.

Fifty-one petroleum locations have recently been made in the Mono Lake region. A new company has been organized, and will begin work as soon as boring machinery can be obtained.

NEVADA COUNTY.

*Centennial.*—At this mine, at Grass Valley, the new company will put up a hoist and pumping plant.

*Pennsylvania Mining Company.*—This company, at Grass Valley, has declared its dividend 39, the first since February, 1900. The property was tied up for about 2 years by litigation with the W. Y. O. D. Mine, but was successful.

*Perrin.*—The New York-Grass Valley Mining Company has finished pumping out this mine. The shaft has been retimbered, and sinking and stoping will now begin.

*Seven-Thirty.*—A fire at this mine has destroyed the boarding house, offices, engine-house, pumping and hoisting plant, and burned the timbers some distance down the shaft. The owner is J. J. Reilly.

*Zeibright Mining Company.*—At this company's property in Little Bear Valley, 4 miles from Emigrant Gap, the boarding house and other improvements are about completed. Fred Zeitler, formerly of the Champion Mine, is president and superintendent. The vein is the north extension of the Bonnie Bee.

PLUMAS COUNTY.

*Consolidated.*—At this placer mine on the North Fork of Feather River, near Butt Valley, J. M. Little has been running a tunnel to develop a gravel deposit. Among the improvements are, 4,000 ft. of ditch and a water-power derrick.

*Round Valley Consolidated.*—This group, near Greenville, has been bought by T. Dunn, of Greenville. There are 5 claims and a 10-stamp mill in the purchase.

*San Jose.*—Good pay is being taken out of the channel at this drift mine, on the North Fork of Feather River, near Butt Valley, by Hugh and Joseph Kelley. They have 2 tunnels, the lower one in 750 ft. They worked steadily 12 years in these tunnels before reaching the channel.

*White Lily.*—This mine is on the upper North Fork of Feather River, 5 miles below Meadow View, and is owned by Mrs. R. K. and S. P. Dunn. The ore is crushed in a 2-stamp Handy mill by water power and averages $12.50 per ton. Only 2 men are at work. The mine has yielded about $40,000 in the past 5 years.

SAN DIEGO COUNTY.

*Owens.*—This mine at Julian is being pumped out, and the new company will sink deeper and drift. If indications are satisfactory they will purchase this and the Washington Mine near-by. The Douglas-Lacey Company is doing the work.

SHASTA COUNTY.

*Conner's Mining Company.*—This company, owning the Conner's group on Salt Creek, has refused a good offer for the property. The ore is of good grade. E. P. Conner is superintendent.

*Old Shasta.*—This mine, on the divide above French Gulch, recently had a mill test which ran $29.50 per ton. J. H. Blagrave and R. L. Grigsby are the lessees.

SISKIYOU COUNTY.

*Highland Mining Company.*—This mine, known formerly as the Musick, is on Russian Creek, some distance from Etna, is producing rich ore. An extension of the vein has been found by J. H. Lewis.

*Snoozer.*—This property, on Russian Creek, about 16 miles from Etna, carries a large ledge of free gold ore. The Zerena Mining Company has sunk a small shaft, and is beginning to cross-cut on. The headquarters of the company are in Chicago.

*Tyrer.*—This claim near Klamath, worked by Tyrer & Co., is keeping its 10-stamp mill supplied with good ore.

TRINITY COUNTY.

*Lily of the Valley.* This mine at Coffee, owned by Osgood, Burnett & Madrew, has been recently shipping ore to the Selby smelting works.

*Little Gem.*—This mine, near Fairview, owned by Geo. Imes, is showing up a 3-foot ledge of $7 ore.

*Union Consolidated Gold Mines Company.*—This Los Angeles company, of which H. Z. Osborne is president, and M. H. McIlvane superintendent, is working the Dorleska Mine at Dorleska, in which a rich strike was recently made on the fourth level. The ore where first struck was 4 ft. wide, including a 10-in. streak of $100 ore. On being followed the vein widened to 29 ft., 20 ft. of which is good grade. The ore was found in the north drift 164 ft. from the shaft. Ore of a fair milling grade is also being taken from another new development in the Dorleska in a north branch of tunnel No. 2, nearly 100 ft. north of the shaft. The mill mine has run from June 3, 1901, to date, excepting 4 months last year, when heavy snow interrupted work. It has been enlarged twice, and another 5-stamp battery is contemplated. There has been about 4,000 tons milled to date, producing over $400,000. An average of 40 men are at work throughout the year, and in summer about 60.

TULARE COUNTY.

A number of men have gone to the upper Kern River region, prospecting. Good float has heretofore been found in that section, but until lately no ledge was discovered. Just north of the present discovery, a mining district was formed 25 years ago, but deposits found were never worked. The roads are poor.

TUOLUMNE COUNTY.

J. H. Neale is working a placer claim on his lot in Sonora, just back of his row of brick business houses on Washington street. A very rich crevice is being worked at a depth of 30 ft.

About 300 miners are on strike in the Jumper, Golden Rule, Santa, Ysabel and App Mines to enforce the rule that only union miners be employed.

*Don Pedro.*—These mines, at Cloudman, 3 miles east of the Old Olsen Mine at Oat Hill, and 9 miles northeast of La Grange, are being reopened by Capt. W. H. McClintock. Preparations are being made to put up new hoisting machinery, and the Mandeville shaft will be sunk 230 ft. deeper.

*Golden Gate.*—The force has been laid off at this Sonora mine, and work is not to be resumed until the company is reorganized.

*Mount Jefferson.*—This company, at Groveland, J. M. Meigham superintendent, has decided to install a 300-ton mill.

*Schoenburg.*—Development work has begun on this mine at Groveland, W. C. Dale superintendent, and a hoist will be installed.

*Star.*—At this mine, at Columbia, E. J. Olsen superintendent, a hoisting and pumping plant are in place, and the shaft sinking is continued.

*Tuolumne County Development Company.*—This company will at once start development on the Blue Jay and Jackrabbit Claims, south of the Providence Mine.

VENTURA COUNTY.

*Contact.*—A. C. Le Baron has bought from Harris Bros., of Bakersfield, this group of mines near Griffin, in the Frasier Mountain District, the price being stated as $20,000.

## COLORADO.

CLEAR CREEK COUNTY.

*Big Five.*—S. A. Knowles, who recently took a contract for driving the Central tunnel 5,000 ft. from the present breast, is pushing the work ahead on his contract. The power is being furnished by the new plant recently completed by the Big Five Company.

*Colorado-Oregon.*—This company, which recently secured the Standard group, which adjoins their property, has started the compressor on the Standard and is pushing ahead the tunnel. It is also sinking on a junction in the No. 2 drift which has disclosed a streak of milling ore carrying values of from $6 to $10 per ton. A streak of smelting ore on the same property has also been encountered carrying values running from $90 to $100 per ton.

*Gold Medal.*—This mine, near Idaho Springs, is reported sold to S. B. Swink, of Denver, Colo., for $50,000. The mine has a 200-ft. shaft, and is well equipped with machinery. It was purchased by Mr. Swink in the interest of Houston and Dallas, Tex., and Birmingham, Ala., people.

*Idaho Springs Mining and Reduction Company.*—At a recent meeting the following officers were elected: D. McDonald, president; W. R. Strasser, vice-president; B. F. Strasser, secretary and treasurer; John N. Isgrig, manager, with B. F. Lowell and B. N. Meyers, directors. A portion of the company's mill is in operation.

*New Year.*—The last payment on this property, situated on Seaton Mountain, has just been made by Theodore Fisher, of Colorado Springs, who now owns the entire property. The mine has been opened up for a considerable depth, with a good showing of lead ore. It is reported that contracts will be let in a

short time for doing considerable development work on the property.

*Old Settler.*—A recent shipment from this property of over 5 tons of unsorted ore netted $43 per ton. This was all taken out in doing the necessary development work. This mine was originally opened in the '60's, when only a high-grade ore could be handled at a profit. When operated in the early days the surface only was gouged and this is the first time that any effort has been made to open up the property at any considerable depth.

*Shafter.*—Manager Roller is getting out about 20 tons per day of milling ore, which is being treated at the Allan mill, on Chicago creek. A fair force of men is employed, some of whom are engaged in development work.

(*From Our Special Correspondent.*)

*Gold Fissure.*—On this property, near Idaho Springs, in charge of Willis Bristol, a cross from the bottom of the 350 ft. shaft has been driven 200 ft. Gardner electric drills are used.

*Josephine Consolidated Mining and Milling Company.*—This company, incorporated under the laws of New Jersey for $250,000, is to operate the Josephine group, about 2 miles west of Idaho Springs. The Josephine was located in 1893. A hoisting plant will be erected, and developments started in the shaft and tunnel. Later a mill may be constructed. The deal was made by James E. Bowden, of Idaho Springs, who will have charge. Samuel F. Munson, of Franklin Furnace, N. J., is secretary.

*North Star.*—In this Yankee Hill property recently, at a depth of 225 ft., a 3 ft. streak of mineral was exposed carrying 200 oz. silver, 1 oz. gold, and 17 per cent lead.

*Trans-Continental Tunnel.*—R. C. Vidler, of Georgetown, the promoter, has just returned from the east, and is preparing to install a compressor.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

*Augusta Gold Mining Company.*—This company has commenced work again on its tunnel running in from Chase Gulch through Winnebago Hill to cut its group of claims. Denver parties are interested with eastern men.

*Beacon of the West.*—Idaho Springs men have taken a lease and bond on the property situated in Russell District and situated a little north of the Waltham, which they sold for $110,000, after developing from a prospect into a mine in less than 12 months. The shaft is 205 ft. deep and machinery will be placed on it at once. M. W. Tanner, of Idaho Springs, will be in charge.

*Cadillac Mining and Milling Company.*—This company has taken a lease and bond on the New Hampshire group of claims in Lump Gulch in the Central Mining District, and is preparing to carry on active developments. Some of the surface ores are being shipped to the company's mill at Gilpin in the shape of test lots. G. D. Kaye, Gilpin, is manager of this company.

*Colorado Tellurium Gold Mining Company.*—Paterson, N. J., parties are interested in the Freedom Mine in Gregory District, and some fine-looking ores are being opened up in the stopes of the 510 east level. Regular shipments are being made to the stamp mills and concentrators. The smelting ores carry values of 5 oz. gold per ton, while the milling ores are of a very fair grade. R. Borcherdt, Central City, is manager.

*Fostoria Gold Mining Company.*—A gasoline plant is being installed on the New York Shaft. The Summit Shaft, down 225 ft., is showing ore. Developments are carried on at four shafts, with about 20 men at work. Bruce Myers, of Central City, is manager.

*Galatea.*—Denver men, representing the owners, are doing some prospecting, and may decide to resume operations. About 7 years ago free gold ore was found in the shaft, but the property was not worked in mining fashion. There is a good plant of machinery on the property.

*Gold Anchor.*—Boulder parties have taken a lease and bond on this property in the Hawkeye District and they are going to clean out the tunnel workings and take out some ores for trial runs. W. H. Myres, Gilpin, is manager.

*Penobscot Mining and Milling Company.*—Valley Falls, Kansas, parties are interested in the Penobscot group of claims in the Independent District, and they are running a tunnel to cut the group with added depth. The shaft when they were driven out at a depth of 205 ft. showed copper-iron smelting ores, and the breast of the tunnel is showing up mineralized stuff. The company is considering the early advisability of erecting a mill, probably a 25-stamp mill, in Gamble Gulch, at the mouth of their tunnel. P. J. Hamble, Perigo, is manager of the property.

*Mont d'Oro Mining and Milling Company.*—This company has taken hold of the old Tippecanoe group, which will be known as the New Century group in the future. Sinking of a new shaft is being carried on and the shaft is down 50 ft. and shows a good crevice of free milling ore as well as a 4-in. streak of smelting ores. The company intend to erect new topbuildings and install a plant of machinery at an early date. E. C. Sherman, Central City, is in charge.

*Powers Mining Company.*—Pennsylvanians are interested and they will install a large boiler at an early date and resume operations on their Powers mine in lower Russell District. This property produces enargite ores running over 20 per cent copper. Burt Storey, of Central City, is looking after the property.

*St. Joseph Mining Company.*—This company owns 3 claims on the boundary of Clear Creek and Gilpin counties, and is finishing a 24 by 50-ft. shaft building and installing a 25-h.p. engine and 70-h.p. boiler, furnished by the Mine and Smelter Supply Company, of Denver. The St. Joseph, or main shaft, is down 165 ft. In cutting a stull in the foot wall about 12 ins. of uranium ore was found. Pennsylvanians are interested. Thomas O'Brien, of Central City, is manager.

*Sydenham Mining, Milling and Leasing Company.*—Sinking has started on a 100-ft. lift, and the shaft will be 410 ft. deep. Some nice looking copper-iron ore is found, and the company expects to open up an ore shoot. The property is known as a producer of very high-grade ores, the milling ores from the surface running up to 30 and 40 ozs. gold per cord at the stamp mills, while the smelting ores have run in to the thousands. Steve Brereton, of Central City, is manager.

GUNNISON COUNTY.

*Smith.*—The Colorado Fuel and Iron Company recently opened another vein of anthracite coal in this mine above Crested Butte. The discovery was made with diamond drill; the vein is 3½ ft. thick and about 70 ft. below the old workings. The company has a fine plant of machinery on the property and will open the new vein by a lower tunnel.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

So far as the Arkansas Valley plant of the American Smelting and Refining Company is running full force, although the Denver disturbers are on the field endeavoring to cause a shut-down. A meeting of leading business and mining men, held this week, passed resolutions condemning such outside interference, and pledging 100 men to the sheriff in case of necessity to preserve order and protect the men who desire to remain at work.

*Fitzhugh.*—This old time Fryer Hill property, idle for years, has been leased from the English Company owning it by Messrs. Timothy Kyle and R. B. Estey for three years, and work will be resumed at once. The company took out some ore in 1896. The mine is equipped with one of the finest plants in the district.

*Helen Gould.*—Operations have been resumed.

*Midas Mining Company.*—The company is shipping about 75 tons daily. At the annual meeting this week, the old board of directors was elected, and selected the old officers, including Sam. D. Nicholson, president; L. A. Reynolds, vice-president, and Julius Rodman, secretary-treasurer.

*Lindsay.*—The operators of this Half Moon property have opened up a well-defined vein of good ore.

*New Leadville Home Mining Company.*—The No. 4 drill hole shows that on top of the parting quartzite there are 50 ft. of iron and ore, and then after passing through some 20 ft. of quartzite there are 30 ft. of ore assaying 12 to 40 oz. silver. A winze has been started to get at the iron first.

*New Monarch Mining Company.*—Preparations are going forward for sinking the Monarch shaft from the 700 ft. workings to 2,000 ft.. Shipments average 175 tons daily. The following have been elected: President, J. C. Kortz; vice-president, H. G. Reddington; secretary, E. A. Steinbrenner; treasurer, J. M. Thomas. Timothy Goodwin was elected general manager.

*Peerless Maud.*—Shipments are 25 tons daily of crude ore and concentrating material, the latter being handled by the Last Chance Mill. Work on the Dauntless and Last Chance has also started for the summer season, and shipments from the Dauntless will begin this week.

*Progressive Mining Company.*—Manager Cooper states that the company has opened the O. K. shaft, and is prepared to ship 25 tons of good iron ore daily. Occasional shipments are also made from the Cady. A low grade iron body has been cut 100 ft. from the shaft.

*Ready Cash.*—The owners of this property have developed the vein in the tunnel for 70 ft. The last lot of 22 tons ran 200 oz. silver and some gold.

*Republic Smelting and Refining Company.*—The first of the matte furnaces has arrived, and Manager Goodwin states that work on the new 1,000-ton plant will be pushed rapidly. Two lead furnaces have already been ordered.

*Sequin-Wells & Moyer.*—Messrs. John and Geo. F. Campion, owners of the Sequin Claim, have secured a 10-years' lease on the Wells & Moyer Placer owned by the Nisi Prius Mining Company, and work begins at once on a new 550-ft. shaft, 600 ft. south of the old Sequin shaft sunk 30 years ago. The company has 70 acres, and anticipated opening up the carbonate ore shoot in the lime.

ROUTT COUNTY.

The interest in the anthracite coal-fields of this county has been renewed by the building of the Moffat Railroad. The field has been extensively explored with diamond drills and has been proved to be of large extent, showing coal of excellent quality.

TELLER COUNTY—CRIPPLE CREEK.

The case of Lewis B. Skinner vs. the Portland Gold Mining Company, in which the plaintiff asked $25,000 damages for alleged breach of contract and in which the company filed a counter claim for $49,000 because of the plaintiff's alleged incompetency and negligence, was dismissed in the district court at Colorado Springs recently, each party to pay its own costs.

*Elkton Consolidated Gold Mining Company.*—At the annual stockholders' meeting, held recently, the following directors were elected: J. W. Graham, Sherwood Aldrich, E. P. Shove, E. M. De La Vergne, M. F. Stark, C. J. Cooper and W. S. Jackson. The two latter were elected to fill the vacancies caused by the resignation of George Bernard and S. S. Bernard. Dr. J. W. Graham, of Denver, was elected president. E. M. De La Vergne vice-president, E. P. Shove secretary and treasurer, and Sherwood Aldrich chairman of the executive committee.

## IDAHO.

BINGHAM COUNTY.

*Idaho Gold Mining and Milling Company.*—A bond has been taken on this company's properties in the Caribou District by John Treweek, of Salt Lake. The property is owned chiefly by Salt Lake people, and consists of five claims adjoining the Pittsburg property.

*Pittsburg.*—This mine in the Mount Pisgah Mining District, consisting of 12 claims, a mill, water rights and other privileges was sold at public auction recently by the receiver, for $25,000. McCornick & Co., of Salt Lake City, Utah, were the purchasers. There was about $20,000 indebtedness against the property. The new owners will improve the mill and develop the property.

IDAHO COUNTY.

*Dewey.*—An ore body, opened in the lower tunnel, is reported to average about $15 per ton. The mill was run during May, but had to be shut down, owing to a broken shaft. A saving of about 80 per cent of the gold value is reported.

*Elk Gold Mining and Milling Company.*—At the recent annual meeting the following directors were elected: James Slavin, J. A. McEachren and William McEachren, of Spokane, Wash.; N. E. Stemfer, of Minneapolis, Minn. J. Slavin, was elected president; N. G. Stemfer, vice-president; J. C. McEachren, secretary, and William McEachren, treasurer. The company owns five claims on Crooked River, and two claims about 15 miles north of Buffalo Hump.

LEMHI COUNTY.

*Black Pine Copper, Mining and Milling Company.*—This group of four patented claims is developed by a 320-ft. tunnel and a 154-ft. shaft. A fine vein of chalcocite and chalcopyrite is reported opened.

*Diamond.*—This group of five claims on Copper Creek, near Lemhi, is being developed by two shafts and a tunnel. The ore is reported carrying nickel. The property is owned by William Swan and others.

SHOSHONE COUNTY.

About 2200 men are employed in the mines of the Coeur d'Alenes. The following gives approximately the number of men at the large mines and mills of the district: Morning, 317; Bunker Hill & Sullivan, 300; Tiger-Poorman, 300; Standard, 291; Last Chance, 194; Mammoth, 177; Frisco, 157; Hecla, 116; Gold Hunter, 66, and Hercules, 60.

The transformer buildings at the mining properties in the Coeur d'Alenes, which are securing electric power from Spokane, were completed recently. These transformer power stations have been erected at the following properties: Bunker Hill & Sullivan, at Kellogg; Empire State-Idaho, at Sweeny; Last Chance, at Wardner; Silver King, at Government Gulch; Mammoth, at Gem; Standard, at Mace; Tiger-Poorman, at Burke, and Hecla, at Gem. Each station is a brick and iron fireproof structure 18 ft. square by 30 ft. high. The line is No. 2 wire and will carry 60,000 volts, stepped down at the stations to 2,000 volts.

*Bullion.*—This mine, near Lookout, which has been

closed for some time on account of water, is about to resume work.

*Chemung Mining Company.*—Judge Morgan recently denied the application of this company for the appointment of a receiver for the $170,000 judgment awarded by the Federal courts to Kennedy Hanley in his suit against Charles Sweeny, F. Lewis Clark and the Empire State-Idaho Mining Company, in the Skookum case.

*Reindeer.*—This company, operating a group of claims about four miles southeast of Mullan, has started its new compressor, operated by water power.

*Silver Cliff.*—This mine near Lookout Mountain, is installing a compressor and diamond drill. The ore carries silver, gold and copper.

*Snowstorm.*—Work continues in the lower tunnel. Good grade copper ore is reported in the upper tunnels.

*Springfield.*—This copper property is hauling ore to Mullan for a trial shipment.

WASHINGTON COUNTY.

*Pittsburg Mining Company.*—This company is reported to have purchased 160 acres of farming and placer ground on the Little Salmon River, near Weiser, and known as Short's Bar, for $12,000. The company, it is said, will expend about $15,000 in developing the property.

## INDIANA.

For the six months ending June 30, the runs of Indiana oil were 4,658,539 bbls., and the shipments 5,962,662 bbls.

CLAY COUNTY.

*(From Our Special Correspondent.)*

The pay-rolls in the block coal districts of this county are the heaviest in the history of the coal industry. It is not uncommon for miners to draw $80 for two weeks' work. The mines are being worked to their full capacity.

GREENE COUNTY.

*(From Our Special Correspondent.)*

The Linton coal-fields of this county have been developed so rapidly as to attract wide attention. The Linton district contains at least 150 square miles of coal-land remarkable for its four workable veins of coal. The Island Coal Company has four mines here, two of which are operated by electricity. The Panhandle Consolidated Coal Company owns 4,700 acres, and J. Smith Tally 4,000 acres. The monthly payroll to miners amounts to $100,000.

PARK COUNTY.

*(From Our Special Correspondent.)*

*Rock Rim Coal Mining Company.*—This company, of Mecca, has leased 700 acres of land on Roaring Creek, northeast of Bloomingdale, and will sink a shaft. A spur from the Cincinnati, Hamilton & Dayton Railroad will be built to the mines. Coal of an excellent quality has been taken from this region on a small scale for years, but until now capital has been lacking to develop the industry.

## MICHIGAN.

COPPER—HOUGHTON COUNTY.

*(From Our Special Correspondent.)*

*Calumet & Hecla.*—No. 4 shaft of the Calumet branch has been sunk to the line of the Tamarack property. Stoping is underway between the first and 57th levels. The lode is 40 ft. wide in places.

*Centennial.*—Shaft A is 2,700 ft. deep. The drift north at the 25th level has opened rich ground 175 ft. from the shaft. The drift north at the 25th level is in 180 ft.

*Elm River.*—This company is confining explorations to the Winona lode. The formation has been opened for a distance of 600 ft. It is about 20 ft. wide.

*Isle Royale Consolidated.*—The second head has gone into commission at the stamp mill. Rock shipments to the plant have been increased to 1,000 tons daily.

*Lake Superior Smelting Company.*—Two new reverberatory furnaces, each 17 by 30 ft., will be constructed at the Dollar Bay plant. One will be used for refining cupola blocks and the other for ordinary smelting and refining.

*Old Colony.*—The crosscut west from No. 1 shaft is in 125 ft. It is being extended to open 2 amygdaloids, cut by the diamond drill.

*Osceola Consolidated.*—No. 1 shaft at the North Kearsarge branch is producing regularly, and the old No. 2 shaft has ceased producing. Several more drills are in commission in Nos. 1 and 3 shafts of this branch.

*Tamarack.*—Opening work at No. 5 shaft is advancing steadily. Drifts have been opened from the 31st to 38th levels inclusive. This shaft is producing about 500 tons of rock daily. No. 3 shaft, of the North Tamarack branch, is 4,900 ft. deep. The 14th level south is in 630 ft., and north 550 ft. The rock shipped to the mill from No. 3 shaft is of a good quality.

*Winona.*—No. 2 shaft is down to the sixth level. Eleven drills are in commission, six being engaged in stoping. The sixth level south from No. 2 shaft is in 1,300 ft. The fourth level drift south is in 1,650 ft. Drifting south at the third level is in 1,500 ft. In the fourth level stope the lode is 40 ft. wide. Daily rock shipments average 200 tons, which is stamped at the Atlantic Mill.

*Wolverine.*—A 200 h. p. Sterling boiler of the locomotive firebox type will be installed in the No. 4 boiler house. Sinking is under way in Nos. 3 and 4 shafts, which furnish the entire rock output. The lowest drifts are opening good ground.

*Wyandot.*—Exploratory work continues, a small number of men being employed. A crosscut is being run west from the bottom of a 250-ft. shaft.

COPPER—KEWEENAW COUNTY.

*(From Our Special Correspondent.)*

*Ahmeek.*—Drifting from the exploratory shaft on the Kearsarge amygdaloid lode has progressed for 150 ft. The lode is rich in copper the entire distance.

*Mohawk.*—The work of installing the third head at the stamp mill is well advanced. Sinking in Nos. 2 and 4 shafts is under way below the seventh and sixth levels. Production comes mainly from Nos. 1 and 2 shafts. A few stopes are opening in No. 3 shaft, which ships a little rock during the day shift. Rock hoisted from No. 4 shaft is stored on the stockpile, which will not be shipped until the equipment is completed. Thirty drills are in commission.

*Phoenix Consolidated.*—A private telephone system has been installed by the Barrett Electric Company at this mine. It consists of 11 stations, connecting the pump levels with the various points on surface and the stamp mill.

COPPER—ONTONAGON COUNTY.

*(From Our Special Correspondent.)*

*Adventure Consolidated.*—Sinking is confined to No. 1 shaft, below the seventh level, and No. 3 shaft, below the sixth level. Drifting and stoping is under way in the Butler tunnel on the Evergreen lode. Crosscutting from No. 1 shaft at the sixth level to tap the Evergreen lode is well advanced. Stopes are being opened on the Butler lode at the second and third levels east and west of No. 1 shaft. The Ogima, Merchants and Knowlton lodes are being opened. Stoping at the fifth level of No. 1 shaft is confined to the Merchants' lode, and at the sixth level to the Butler. Drifting east and west at the sixth level is under way. Stoping on the Ogima, Butler, Knowlton and Merchants' lode is under way at the third level of No. 3 shaft. Stoping at the fourth level is confined to the Butler, and at the fifth drifting west on the Knowlton is well advanced. Ten drills are engaged in opening up new ground. Rock shipments average 700 tons daily.

*Mass Consolidated.*—Rock shipments to the mill at Keweenaw Bay have been reduced, and a closer selection is made.

## MONTANA.

FERGUS COUNTY.

*Barnes-King.*—This group of 15 claims, at Kendall, is working steadily. The 100-ton mill has been increased to 250 tons daily capacity. The property is developed by one 500-ft. shaft. E. W. King, of Lewiston, and A. R. Ledoux, of New York, are interested.

*Kendall.*—This property, near the Bames-King group, is being developed by Finch & Campbell, of Spokane, and is attracting considerable attention.

*Sunrise.*—A bond has been taken on this group of claims by Amos P. Pendleton and J. H. Mauritis, of Chicago.

FLATHEAD COUNTY.

*Banner & Bangle.*—This mine, 6 miles south of Troy, under bond to Larson & Greenough, is reported showing up well. Eight men are employed at the mine, and others are repairing the road to Troy.

JEFFERSON COUNTY.

J. H. McCabe has purchased the Nash ranch in the Wickes-Corbin District for $5,000, supposedly as a site for reduction works.

*Daly.*—Large shipments to the smelters are being made from these properties at Wickes by the lessees, Mulvahill & Ely.

*Jacquenain.*—This property, in the Wickes-Corbin District, is reported sold to the Pittsburg Smelting Company for $60,000. The ore carries a large percentage of iron, and is desired by smelters as a flux.

LEWIS & CLARKE COUNTY.

*Lee Mountain Mining Company.*—About 800 tons of ore are shipped monthly from the mine near Helena. The shipments are to be largely increased.

*Mission Peak Mining Company.*—This company, it is said, will build an $8000 cyanide plant for treating its ores.

*Missouri & Montana Company.*—This company, which recently purchased the Sure Thing Mine in the Ontario District for $75,000, is pushing development work with a large force. Carrol and Martin, of Helena, the largest stockholders, intend erecting a smelter on the property.

*North Star.*—A large force is to be put to work on this property in the Marysville District. Preparations are being made to start the Bald Butte Mill.

MISSOULA COUNTY.

*Montana Antimony Mining and Milling Company.*—The property in the Burro District is to be sold at Sheriff's sale July 29.

*Tarbox.*—A double compartment shaft is being sunk from the 225 ft. level to the 400 ft. point, at the rate of 15 ft. per week. It is intended to erect a 100 ton mill. The ore carries lead and silver.

PARK COUNTY.

The new mill at Jardine is running satisfactory, and about 100 men are employed, 70 in the mine. When the cyanide plant is in operation about 350 men will be employed. It is expected to have the plant ready in October.

*Montana Coal and Coke Company.*—The company has decided to resume work at its mines and coke plant at Horr, as soon as the mines can be unwatered. The company expects to be running 260 ovens soon.

## NEVADA.

*(From Our Special Correspondent.)*

United States Circuit Judge Hawley, at Carson, has decided in the case of Ritter vs. Lynch that the building of a dam, and the maintainance and preservation of the tailings impounded, entitled the party so doing to the ownership.

New gold fields have been found 18 miles north of Searchlight. Both quartz and placer claims have been found. The placer belt is confined to narrow canyons, but ledges are said to be numerous. A number of men have gone to the camp from Searchlight, and also from Needles, Cal.

## NORTH CAROLINA.

CABARRUS COUNTY.

*Phoenix.*—This mine is reported sold by A. Thies to the Miami Mining Company, of Pittsburg, Pa., for $18,000. The company has been operating the property during the past 2 years under an option, and will make improvements and add machinery.

MONTGOMERY COUNTY.

*(From Our Special Correspondent.)*

*Iola.*—This gold mine produced in the 7 weeks ending July 1, 72 lbs. of gold bullion, valued at $13,000, and deposited at the United States assay office at Charlotte, N. C. The company is running a 10-stamp mill and has good ore reserves. The cost is not over $1,400 per month. The mine was discovered about 2 years ago,, and has paid well ever since.

## PENNSYLVANIA.

ANTHRACITE COAL.

The Jonathan Beasley tract of land near Aristes, Columbia County, has been purchased by the Catawissa Coal Company from J. B. Staley and wife for $225,000. The company, composed of Mt. Carmel, Shamokin, Philadelphia and Lancaster capitalists, had been prospecting the property and is said to have discovered anthracite coal.

BITUMINOUS COAL.

*Berwind-White Coal Mining Company.*—Judge Archibald of the United States Appellate Court in Philadelphia, recently sustained the judgment of $86,586, obtained by John C. Martin against the company in the Circuit Court. The amount represents royalties on coal lands from 1892 to 1902. An appeal was filed.

## OHIO.

For the six months ending June 30, the runs of Ohio oil were 7,945,563 bbls., and the shipments 9,122,206 bbls.

## SOUTH DAKOTA.

CUSTER COUNTY.

*(From Our Special Correspondent.)*

*White Cloud Gold Mining Company.*—A new vein is reported on this company's group on Laughing Water Creek. The vein is 4 feet wide.

LAWRENCE COUNTY.

*(From Our Special Correspondent.)*

*Columbus Consolidated.*—A water right has been purchased on False Bottom Creek.

*Dakota Mining and Milling Company.*—Bonds are being sold for the raising of funds with which to enlarge the cyanide plant at Deadwood.

*Gilt Edge-Maid Gold Mining Company.*—This company has just been formed with a capitalization of $1,000,000. The Gilt Edge and Dakota Maid mines have been consolidated, the purchase price being $150,000 for the two mines. Directors are J. L. Turner, president, Springfield; William Lardner, vice-president, Deadwood; William Selbie, treasurer, Deadwood; John R. Wilson, secretary, Deadwood; G. A. Duncan, general manager, Deadwood, and W. D. Lowry, director, Minneapolis, Minn. A 125-ton cyanide plant is to be built.

*Hidden Fortune.*—The 60-stamp mill at Deadwood has been closed, pending the installation of amalgamating plates. The ore has been carried directly to cyanide vats, but it contains coarse gold, which cannot be saved in this way. The improvements will require about 10 weeks.

*Penobscot Mining Company.*—The cyanide mill is paying for the operation of the mine and for the shipment of ore to Denver smelters. The crushing department is working one shift, which more than supplies the leaching department. The company is shipping from 50 to 100 tons of ore daily.

*Reliance Gold Mining Company.*—A meeting of the stockholders of the University and Ak-Sar-Ben companies will be held in Deadwood July 11, to ratify the merger. J. B. Empson, of New Zealand, has been engaged as assayer and chemist for the new company.

PENNINGTON COUNTY.

(*From Our Special Correspondent.*)

*Ajax Mining Company.*—Work is being started in the old Standby mill and mine.

*Burlington Mining Company.*—A two-story boarding house and other buildings have been erected on the ground at the head of Friday Gulch, and timbers are being cut for the shaft. J. B. Taylor is superintendent, with headquarters at Hill City.

*Columbia Gold Mining and Milling Company.*—Work has been stopped at the shaft, owing to disagreement among the officials and stockholders.

*Empire State Company.*—Considerable ore is found in the Golden Slipper Mine, and the 5-stamp mill is working regularly.

*Holy Terror Mining Company.*—All work has been suspended. There are a number of heavy personal judgments against the company for damages sustained by employes and the suspension is said to be for settling these difficulties. All employes have been discharged and the mine allowed to fill. The $7,000 pump is in the bottom.

*Mainstay Mining Company.*—This company has purchased the Ida Florence Mine and Bismarck 40-stamp mill. T. R. Griffith is manager, at Keystone.

## TENNESSEE.

BRADLEY COUNTY.

*Chatata Land and Zinc Mining Company.*—At a recent meeting of the stockholders at Nashville, George S. Obear, of Atlanta, Ga., was appointed a director and general manager. Additional machinery will be added, and the property developed.

## UTAH.

(*From Our Special Correspondent.*)

*Ore and Bullion Shipments.*—Salt Lake banks reported settlements for the week ending July 17, as follows: Crude ores and concentrates, $144,350; base bullion, $147,700; gold bars, $22,400. Total, $314,450.

BEAVER COUNTY.

(*From Our Special Correspondent.*)

*Blue Acre Copper Company.*—At a meeting of the stockholders in Salt Lake City, July 15, directors were chosen who organized as follows: President, Henry M. Crowther, Salt Lake; vice-president and treasurer, Wallace W. Wait, of Kansas City; who, with G. C. Van Alstyne, of Boston; H. M. Bates, of Roxbury, Mass., and James H. Letson, of Alexandria, Minn., are directors.

*Newhouse Mines and Smelters.*—Articles of incorporation have been filed. The capital stock is $6,000,000, divided into 600,000 shares. The directors of the company are Louis Kramer, Theodore L. Hermann, William C. Taylor and Anton L. Dittmar, all of New York. R. Stingley, of Frisco, Utah, is named as the resident representative.

JUAB COUNTY.

(*From Our Special Correspondent.*)

*Tintic Shipments.*—For the week ending July 17, shipments amounted to 118 car-loads, as follows: Centennial-Eureka, 34; Bullion-Beck, 3; Genuine, 6; Carisa, 4; Grand Central, 19; La Clede, 1; Mammoth, 1; Star Consolidated, 5; Uncle Sam Consolidated, 6; Victor Consolidated, 3; Dragon Iron, 15; Noon's Iron, 5; Black Jack, 16.

*Centennial-Eureka.*—The work of sinking the shaft will be done hereafter by contract.

*Gemini.*—The shaft at this property, now down 1,600 ft., is to be sunk 400 ft. deeper.

*Lower Mammoth.*—Shipments have been curtailed until connections are made between 1,200 and 1,100 ft. levels.

*South Swansea.*—The sinking of the shaft at this property has been completed to 860-ft. depth. A station will be cut and drifting commenced.

*Uncle Sam Consolidated.*—This mine, under the manageemnt of James Chipman, of Salt Lake, is shipping steadily. Recent developments on the lower levels insures an ore supply for some time.

*Yankee Consolidated.*—The new 6-drill air compressor has started. The ore bodies below the tunnel level are to be opened.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Work has been commenced on the extension of the Copper Belt Railway to the Yampa, Boston Consolidated and Utah Copper Company's mines. The road will also connect with the Yampa Smelter and the proposed concentrator of the Utah Company.

*Bingham Consolidated Smelter.*—Shipments for the week ending July 10 were five cars, 300,000 lbs.

*Columbus Consolidated.*—Manager Tony Jacobson, at Salt Lake City, has called for bids for the construction and equipment of an electric power plant. It is to cost about $35,000, and will have two Pelton water wheels, two 3,000-kw. dynamos, 4,500 ft. of 20-22-in. steel water pipe, and a 4½-mile transmission line.

*United States Smelter.*—Shipments for the week ending July 10 were four cars, 240,000 lbs.

*Utah Consolidated Smelter.*—Shipments of copper bullion for the week ending July 10 were four cars, 241,000 lbs.

*Utah Copper Company.*—A 320-acre tract of land has been purchased by this company near Garfield Beach, including valuable water rights. It is proposed to erect on this site a concentrating plant of 3,000 tons daily capacity. The initial plant may be built below Bingham on property under bond from the West Mountain Placer Company, and will have capacity for handling 500 tons daily.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

*Park City Shipments.*—For the week ending July 17, the shipments were, 3,913,880 lbs., as follows: Daly-West, 1,800,000; Silver King, 1,974,880; Loring Brothers, 139,000.

*American Flag.*—Cross-cutting to the ore bodies has begun from the 600-ft. level. Ore shipments will start at once.

*Keith-Kearns.*—It is expected that the mill will be ready about October 1. Thirty-five men are employed.

*Little Bell.*—Two important strikes are reported, both on the 50-ft. level. Solon Spiro, of Salt Lake, is manager.

## WASHINGTON.

FERRY COUNTY.

(*From Our Special Correspondent.*)

*Quilp.*—During June, 98 car-loads of ore were shipped, 18 to the Granby Smelter and 80 to the Tacoma Smelter. The night force of 10 men has been laid off because the Granby Smelter cannot take more ore from the mine at present. From July 1 to 14 only 26 car-loads were shipped, although the mine looks better than ever. An upraise on ore connecting the 540 and 340-ft. levels has been made, and a winze, now 60 ft. deep, is being sunk on the pay shoot on the lower level.

*Trade Dollar.*—A shipment of 60 tons was made recently to the Hall Mines Smelter. Drifting on the vein is temporarily suspended. The ore runs from $16 to $23 per ton.

*Zala M.*—A contract has been let to haul the ore to the Republic & Kettle River Railway during the summer and fall. The mine is shipping 10 tons per day.

## WEST VIRGINIA.

LOGAN COUNTY.

*Mount Fisher Coal and Coke Company.*—This company is opening up a large tract of coal land, near Logan, in the Guyan Valley.

FAYETTE COUNTY.

*Loup Creek Colliery Company.*—This company is building 500 coke ovens, at Robson, on the Deepwater Railroad, connecting Deepwater on the Chesapeake & Ohio, and Bluefield on the Norfolk & Western. The plant will be increased to 1,000 ovens. William J. Rhoderio, of New York City, is constructing the plant.

## WYOMING.

CARBON COUNTY.

*Elk Mountain Copper Company.*—New Machinery, including an electric plant, is being installed at this company's property, near Encampment.

*North American Copper Company.*—A new shoot of rich copper ore is reported in the breast of the tunnel level 18 ft. east of the known ore-shoot. The 16-mile tramway recently transported 300 tons of ore in one day, at a cost of 1c. per ton-mile. John S. Cary, of Denver, Colo., is president, and Wills G. Emerson, of Encampment, vice-president.

# FOREIGN MINING NEWS.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

*Boundary Coal Mines, Limited.*—At a recent meeting of the directors it was decided to bond the properties to J. R. Carling, of Exeter, Ont., who represents New York City capital. The bond provides for the expenditure by the purchasers of sufficient money to install a diamond drill outfit and thoroughly explore the property, work to be started within four weeks. The property consists of 2560 acres of coal land in the North Fork Coal Basin, 50 miles north of Grand Forks. William Blakemore is superintending work.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

*Rossland Shipment.*—The ore shipments for the week ending July 11 were: Le Roi, 3,840 tons; Centre Star, 1,470; War Eagle, 1,170; Kootenay, 270; Le Roi No. 2, 450; Velvet, 125; Giant, 60; Jumbo, 100; total for the week, 7,485 tons; for the year to date, 192,997 tons.

BRITISH COLUMBIA—VANCOUVER ISLAND.

*Washington Colliery Company.*—An explosion occurred at this company's colliery in the No. 3 incline in No. 6 mine, in which 20 Chinese were killed. About 50 Chinese were working in the mine at the time.

NOVA SCOTIA—CAPE BRETON.

*Dominion Coal Company.*—This company reports for June a total of 283,000 tons of coal mined; showing an increase of 31,187 tons over June, 1902.

## MEXICO.

SONORA.

*Greene Consolidated Copper Company.*—At a meeting of the board of directors, J. W. Gates and F. H. Ray were elected to fill vacancies in the board. These with Messrs. Hawley, R. H. Huntington were elected members of the executive committee.

## SOUTH AMERICA.

BRITISH GUIANA.

The gold production of the colony in the month of April, on which royalty was paid, is reported by the Department of Mines as 8,495 oz., which compares with 9,133 oz. in April, 1902; showing a decrease of 638 oz. for the month.

TRANSVAAL.

The gold production of the Transvaal for the month of June is reported at 238,320 oz. fine gold against 234,125 oz. in May, and 142,780 oz. in June of last year. Of this year's production 228,167 oz. came from the Witwatersrand mines, and 10,153 oz. from mines in the outside district; principally from the Sheba. For the six months ending June 30, the total output was 1,313,573 oz. fine gold, which compares with 656,731 oz.; that is, the production was nearly doubled. One mine was added to the producing list in June. The total number of natives sent to mines in June, by the Native Labor Association, was 7,009, and the number of laborers leaving was 5,057, showing a net gain of 1,952 only. The total number employed at the end of June was 64,454 Kaffirs.

# MINING STOCKS.

(Full quotations are given on pages 146 and 147.)

**New York. July 22.**

The week has been an exciting one on the general stock market, but the events going on there rather diverted attention from the special lines of mining stocks. The notable point on the Exchange was the heavy fall in industrials. United States Steel on Tuesday reached its low point at $22 for common, and $70 for the preferred, both stocks recovering a small fraction at the close. Amalgamated Copper dropped to $44⅜ on July 21, recovering to $45 at the close, and at the present writing a further fall seems probable.

The outside companies did not show as much activity as might have been expected. The fall on the big exchange, as above stated, took up everybody's time, and there was less opportunity for the curb traders. Green Consolidated declined as low as $19¾, closing at $20; Tennessee Copper sold at $28½ on July 22, a decline of three points, which was chiefly sympathetic; White Knob, of Idaho, closed at $10 bid, with no stock offered at that price; United Copper was traded in to a small extent at prices ranging from $17@$19.

Standard Oil, among the outside securities, suffered heavily, losing on Tuesday five points and selling down to 8635.

In miscellaneous mining stocks Horn Silver sold at $1.80. In the Cripple Creek stocks, Moon Anchor showed one transaction at 8½c., and 1,000 shares Pharmacist sold at 3c. In the Comstocks only a few transactions were recorded. Sierra Nevada brought $1.50; Consolidated California & Virginia, $1.30@$1.25; Mexican, $1; Occidental, 30c. and Justice, 14c.

As noted last week, the Amalgamated quarterly dividend was not changed, ½ per cent. being declared for the quarter. Quincy has declared a $3 dividend.

### Boston. July 21.

*(From Our Special Correspondent.)*

The continued selling pressure in Amalgamated Copper has completely undermined speculative confidence in mining shares here, and as a result prices have continued to drift downward. Thursday last stocks were quite buoyant, in sympathy with the stronger tone in New York, but prices did not hold and stocks closed below the level of a week ago. There is an unsettled feeling regarding the metal. Some exchanging of Amalgamated for Copper Range Consolidated is reported, which has kept the price of the latter a point or two above Amalgamated. Copper Range fell $3.25 to $46, while Amalgamated touched $44.25. Current prices of Copper Range are the lowest since consolidation with the Baltic; in fact most of the prevailing prices for copper shares are about the lowest and some are selling at low record prices.

A drive in Osceola broke the price $4 to $48, but it recovered to $50. Tamarack also broke $8.25 to $84.75 on light offerings. The increase in the Quincy mining dividend has imparted a better tone and the stock is firm around $97. Tri-mountain holds around $84.. It is expected that the regular dividend will be declared next month by the Tri-mountain management. Utah Consolidated has fallen $2 to $24.50, but it is nothing more than forced liquidation that has brought the decline. United States has varied from $18.50 to $20, closing at $19. Some exchanging of this stock into Utah is reported.

Bingham is off $1.37½ for the week to $23. Mohawk went off $3 with the rest of the list to $35.75, which invited some buying. Centennial, which stiffened to $17.37½, broke to $15, with recovery of less than $1. Isle Royale made its low record at forced selling. It touched $5.25, but subsequently rallied to $8. Old Dominion fell to $10.75. Wolverine is off $1.50 to $63.50.

### Colorado Springs. July 20.

*(From Our Special Correspondent.)*

The market was strong and weak alternately; Isabella, Elkton, El Paso and Portland were the features and all but the latter showed declines during the past seven days. Isabella opened at 11⅜c., advancing to 11½c., losing all that it gained and more, so that the closing sale to-day was at 10½c. Elkton started off bravely, selling at 42, but lost to 40½, regaining some of the ground, and closing at 41. The annual stockholders' meeting was held this week, when the Aldrich-Graham faction went into power, as was predicted in this letter several weeks ago. El Paso fell off in sympathy with its neighbor Elkton, losing from 58¾c., the high point of the week, to 58c., which was yesterday's closing sale and the last transaction of the week. Portland sold at $1.25 all the week, and closed with $1.25 bid and $1.30 asked.

As to the strike situation among the Colorado smelters, nothing developed this week, and it is rumored in highly respectable mining circles that this trouble had its origin in another quarter than the discontented labor unions. It is freely stated here in this connection that the trouble was stirred up to frighten a $5,000,000 smelter combine which, it is reported, was forming to enter the Colorado mining field. However much of truth there may or may not be in this report, the labor trouble has had the effect of interfering with the proposed anti-trust smelter combine which it is known was forming.

Reports have come in this week of the discovery of some very rich gold deposits in Gunnison County, 140 miles west of this place. It is too early to place much dependence on the general reports.

### Salt Lake City. July 18.

*(From Our Special Correspondent.)*

This was the dullest week of the year for the Salt Lake Stock Exchange, the total sales aggregating 126,368 shares, which brought $60,541. The leading traders were Tintic district stocks, principal among them being Lower Mammoth, May Day, Star Consolidated and Uncle Sam Consolidated, all of which closed lower. May Day was assessed 2c. a share. Lower Mammoth got up as far as 86c. a share, but slid back to 77c. to-day. Grand Central directors have declared the usual dividend of $25,000 payable July 26. There was a good demand for Sacramento, and 21,400 shares went at steady figures. The July Daly-West dividend was distributed this week, amount $108,000, but the stock was kept low; 598 shares transferred. Another active stock was New York Bonanza, which ran up to 35c., but declined again towards the close. Daly-Judge opened weak, but closed stronger. Consolidated Mercur is firm. The management announces that it will probably be August 1 before the mill will be ready to go into commission again.

### San Francisco. July 18.

*(From Our Special Correspondent.)*

Mining stocks on the old Exchange were quiet, but as a general thing fairly steady. About the middle of the week there was a little flurry in the North End Comstocks, which sent up prices a few points; but it did not come to stay, and shares were rather flat thereafter. Ophir sold at $1.55@$1.60; Consolidated California & Virginia, $1.45@$1.50; Mexican, $1.05@$1.10; Hale & Norcross, 60c.; Sierra Nevada, 60c.; Belches, 43c.; Overman, 32c.; Potost, 23c.

On the San Francisco & Tonopah Exchange business was quite lively; and prices generally were good. Outsiders seem to be taking considerable interest in these stocks, and there were a good many sales, both of the higher priced shares and of the prospects. Some prices noted are: Tonopah Nevada, $8; Belmont, $2.10; North Star, 55@60c.; Montana Tonopah, 88c.; Paymaster, 20c.; Colehan, 20c.; Gold Mountain, 10c.; Esperanza, 6c.

The sworn statements of the mining companies, as filed in their offices this week in compliance with law, show cash on hand July 1, as follows, with all expenses paid, unless otherwise mentioned: Alpha, $2,807; Andes, $171, with $500 due bank; Belcher, $8,679, with $1,000 due bank; Best & Belcher, $214, with liabilities of $6,000; Bullion, $1,365; Caledonia, $13,982, with June expenses unpaid and $3,509 due treasurer; Chollar, $2,585; Confidence, $3,574, with June expenses unpaid; Consolidated California & Virginia, $2,806; Crown Point, $3,209; Consolidated New York, $134; Challenge Consolidated, $1,283; Consolidated Imperial, $755; Gould & Curry, $7,070, with bills receivable of $5,000; Justice, $8,158; Julia Consolidated, $1,083; Ophir, $5,414; Overman, $1,583, with June expenses unpaid; Mexican, $3,690; Potosi, $2,167; Savage, $139; Segregated Belcher, $666, with June expenses unpaid, and indebtedness of $1,000; Silver Hill, $19,895; Sierra Nevada, $1,124; Standard Consolidated, $95,037, with June bullion clean-up and June expenses to be accounted for; Syndicate, $2,292; Union Consolidated, $5,795; Utah Consolidated, $295, with June expenses partly unpaid, and with liabilities of $4,000.

Business in oil shares was rather quiet, with comparatively little buying. Home sold at $3; Monte Cristo, $1; Reed Crude, 40c.; Lion, 60c. The low-priced shares were chiefly in favor.

## COAL TRADE REVIEW.

New York, July 22.

ANTHRACITE.

The anthracite coal trade shows no change from last week. Demand continues strong enough to absorb the entire output of the mines, though production continues heavy. The miners are working pretty steadily now that the Conciliation Committee is taking up the questions brought before it, and prospects of any labor troubles of importance are very remote. An interesting rumor of the week is to the effect that the Goulds are to take over the Lehigh Valley Railroad. This report, if true, indicates that the control of the anthracite trade will be less centralized than it has been, and there will be less excuse than formerly for sensational newspapers talking about the "Coal Trust."

In Lake Superior territory trade at retail is quiet, but arrivals by Lake are slow, the estimated arrivals at the head of Lake Superior to date being under 250,000 tons. The result is that practically all the coal that has arrived has been sold, and dealers are receiving orders from country points which they cannot fill. In Chicago territory buying, which was expected to fall off after July 1, continues good, there being apparently a large number of householders still trying to lay in winter supplies. Egg is the size most wanted. In the wholesale trade, though some dealers at Chicago have fair supplies, others have little; and there is still a good demand from points west of the Mississippi. Along the lower lakes and in Canadian territory demand is less active. The movement up the Lakes from Buffalo is fairly heavy. Along the Atlantic seaboard buying is still pretty brisk, as many small yards are still trying to lay in coal at discounts. Demand from points beyond Cape Cod is particularly good, and the coastwise movement of coal is heavy. The average tidewater selling price at New York Harbor for prepared sizes in June was $4.60. Generally speaking, though demand, as noted above, is strong all over the country, premiums for spot delivery are no longer paid.

BITUMINOUS.

The Atlantic seaboard bituminous trade continues quiet, but a change is expected before long, when consumers begin to prepare for winter and dealers at shoal water ports want supplies. Car supply at the mines is very poor indeed, and it is this rather than any demand for coal which keeps prices where they are. Shippers, in view of the light demand, are not pressing for better car supply.

Trade in the far east is less active than it has been. The shortage in vessels continues to delay shipments. Long Island Sound trade continues very quiet indeed, the demand being slight. There is no particular change in the trade at New York Harbor points, where the small sizes of anthracite continue in good supply. Prices for Clearfield grades range around $2.65 f. o. b., New York Harbor shipping port. In the all-rail trade shippers continue to take about 75 per cent of their contract requirements.

Transportation from mines to tidewater is good, coal running through in five days. Car supply, which last week was improving, has fallen off badly and now ranges down to 25 per cent of the demand. In the coastwise vessel market, vessels are still scarce and are wanted. We quote current rates of freight from Philadelphia: To Portland, 90@95c.; Portsmouth and Bath, 95c.; Salem, 90c.@$1.10; Newburyport, $1.15; Saco, $1.20 and towages; Gardiner, $1.05@$1.10 and towages; Providence, New Bedford and the Sound, 80c.; Bangor, $1.10. From New York Harbor ports to Boston, Salem and Portland, $1@$1.25; the Sound, 75c.

### Birmingham. July 20.

*(From Our Special Correspondent.)*

The suspension of work at the coal mines in Alabama employing members of the United Mine Workers of America, is still on and something like 70 per cent of the usual production of coal in this State is off. There is a prospect, however, of the entire matter coming to an amicable end. Propositions between the miners and operators looking to an arbitration of the demands of the miners, who seek an advance of 5c. per ton, eight hours a day and semi-monthly paydays, have been made. This will likely bring about a resumption of work at the mines by the end of the present week. The mines in Jefferson County which made temporary contracts, pending the settlement throughout the State generally, and those mines operating with convict labor and non-union labor, have been mining a larger amount of coal than they did formerly, and there has been a ready demand for all that could be gotten out. Good prices prevail. Many of the larger consumers had accumulated considerable coal, and this has not yet all been worked off. The suspension of work on the part of the miners has given the market a little opportunity to right itself, and the demand should be steady through the balance of the year, when the resumption of work does come.

During the past week a declaration of incorporation was filed here by the Berks Coal Company, with a capitalization of $100,000. The incorporators are Isaac F. March, of Reading, Pa.; Milton L. Ritter, of Cordova, Ala., and L. J. Haley, Jr., of Birmingham, Ala. The following officers were chosen by the directors: Harry England, president; Isaac March, vice-president; C. L. Klopp, secretary; W. M. Croll, treasurer. The company will mine coal in Walker County, Alabama.

### Chicago. July 20.

*(From Our Special Correspondent.)*

The heavy sales of anthracite continue undiminished and unchanged, except that the demand for egg is being better supplied. Apparently July will equal, if it does not surpass, the record of June. City and country trade are both giving wholesalers all they can do to fill orders and no extensive stocks are yet being accumulated by wholesalers. In the city, retailers are disposing of their anthracite as fast as they get it; in the country, stocks are being accumulated by many retailers. Consumers are directly responsible for the heavy demand, to all appearances; their fears of shortage next winter are not yet calmed, and they will take no chances, with the memory of last winter's experience in their minds. The all-rail deliveries of anthracite continue to be small, in view of the prospects that the lake will supply the bulk of the demand on even more favorable terms as regards rates and cargoes than in previous years.

The bituminous market, so far as Western grades are concerned, is improving; it is in a much healthier condition than heretofore. Indiana and Illinois lump from the best mines is selling at $2.25@$2.40, and is in comparatively good demand. Hocking retains its popularity and is quoted at $3.40; the supply is good. Smokeless is dull; sales are said to have been made at $3.30@3.40. To all appearances, smokeless

will have permanently only a small part of the popularity it gained last winter, when it was generally used as a substitute for anthracite. Youghiogheny continues in steady demand at $3.60.

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**Cleveland.** July 21.

(*From Our Special Correspondent.*)

The lake coal market is dull at present. The Buffalo hard coal shippers, in hope of being able to move their material more cheaply, hammered the carrying charges down 10c. a ton generally. The soft coal ports did not follow, because it was appreciated that any movement of this sort would retire some of the small tonnage from the market. This introduces a new policy among the coal shippers, that of keeping the tonnage moving freely all summer, regardless of a lessening of the mid-season rates, thus avoiding a rush for boats in the fall, when rates normally climb. The movement is slightly increased by this new policy, as there is no contention now about carrying charges, the Buffalo shippers having resumed the higher rate. The rates are 50c. to Milwaukee and 40c. to Lake Superior.

The domestic coal supply is all that could be desired. The movement is very free, the furnaces and mills having all they can possibly use and the market being generally easy. There is a big movement toward the accumulation of stock-piles in the Cleveland yards, preparatory to the fall rush and the effects of this movement is seen. The supply of coke is all that could be desired. The furnaces are getting enough, with a little urging, to keep their stacks going and the foundries are likewise well supplied. Prices are holding firm and strong.

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**Pittsburg.** July 22.

(*From Our Special Correspondent.*)

*Coal.*—Another small rise in the rivers enabled the Monongahela River Consolidated Coal and Coke Company to get out about 1,000,000 bush. of coal. It is likely that more will be sent out later in the week as the prospects are good for more water. There are plenty of empty coal-boats and barges and the river mines will be kept in full operation for several months. All the railroad coal mines are running and the railroad car supply is good. The demand is fair and prices established on April 1 are well maintained.

*Connellsville Coke.*—The demand for standard Connellsville coke continues and the price for furnace coke remains at $3 with 50 to 75c. a ton more for foundry. The good supply of standard coke has taken away trade from the producers of outside coke and the price of rich coke has dropped to $2.25 for furnace and $2 could probably be done. The *Courier* in its last weekly report gave the production for the previous week at 250,162 tons. The shipments were 10,730 cars, distributed as follows: To Pittsburg and river tipples, 4,302 cars; to points west of Pittsburg, 4,878 cars; to points east of Connellsville, 1,550 cars. This was a decrease of 370 cars compared with the shipments of the previous week.

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**San Francisco.** July 18.

(*From Our Special Correspondent.*)

The circular of Mr. J. W. Harrison, just issued, says: "Since the departure of the steamer *Sierra* there have been the following arrivals of coal from Newcastle, N. S. W., viz.: *Hollywood*, 2,580 tons; *Loch Carron*, 2,941 tons; total, 5,521 tons. There two cargoes were much needed and delivery of each was made from ship's side to consumers. Within the next 30 days there should be 16 coal arrivals from Australia, with about 45,000 tons. All of these cargoes have passed out of first hands, hence the market will not be disturbed. There are still 78 vessels on the chartered list to carry coal here from Newcastle and Sydney, 27 of which have already sailed, and the remainder should arrive prior to the end of the year. About 70,000 tons of Japanese coal were negotiated for about 60 days ago, 50,000 of which will go to the Southern Pacific, and about 20,000 tons to the Canadian Pacific Railroad in British Columbia. The delivered prices were very low, and will make an inroad into sales of Australian. The miners in British Columbia are returning to work, and coal shipments from there will commence again in the near future, so that there will be no scarcity for a few months of fuel of all kinds, and the outlook is that lower prices should rule. There is marked advantage for coal as a steam fuel in the future, as producers of oil have materially advanced their prices for future deliveries. Oil contracts are being made at an advance of fully 25 per cent, extending over a very long time for future delivery."

Yard prices for Pacific Coast coal to dealers in large lots are as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle, $6.50; Bryant, $6.50; Coos Bay, $4.50. Rocky Mountain coals in large lots, ex-car, are quoted at $14 for Colorado anthracite and $8.50 for Utah and Wyoming coals. Eastern coal is scarce, but quotations remain nominally at $14 for Pennsylvania anthracite and $13 for Cumberland in cargo lots. Foreign coal sells in large lots as follows: Welsh anthracite, $13; cannel, $8.50; Brymbo and Wallsend, $7.50.

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**Foreign Coal Trade.** July 23.

Exports of coal from Great Britain, entered to the United States, for the six months ending June 30, were as follows:

| | 1902. | 1903. | Changes. |
|---|---|---|---|
| Atlantic Coast ports | 4,200 | 1,031,370 | I. 1,027,170 |
| Pacific Coast ports | 56,771 | 50,615 | D. 6,156 |
| Total | 60,971 | 1,081,985 | I. 1,021,014 |

The heavy exports to Atlantic ports are about over; the total in June of this year was only 2,646 tons.

Exports of fuel from Great Britain for the six months ending June 30 were as follows, in long tons:

| | 1902. | 1903. | Changes. |
|---|---|---|---|
| Coal | 20,049,398 | 21,724,922 | I. 1,675,524 |
| Coke | 285,929 | 312,919 | I. 26,990 |
| Briquettes | 530,646 | 451,462 | D. 79,184 |
| Totals | 20,865,973 | 22,489,303 | I. 1,623,330 |

In addition to these exports there were 7,890,636 tons of coal sent abroad for the use of steamers engaged in the foreign trade, against 7,188,787 tons last year; showing an increase of 701,849 tons.

Messrs. Hull, Blyth & Co., of Cardiff and London, report, under date of July 11 that prices for Cardiff and Monmouthshire coals are still very firm, with an upward tendency, and are difficult to obtain for prompt shipment. The prevailing fine weather is causing the miners to take holidays. Quotations are: Best Welsh steam coal, $3.84; seconds, $3.66; thirds, $3.54; dry coals, $3.36; best Monmouthshire, $3.30@$3.36; seconds, $3.24; best small steam coal, $2:10; seconds, $1.98; other sorts, $1.86.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The freight market is still quiet. Mediterranean slightly easier, especially Genoa, where the labor difficulty is now settled. Some rates quoted from Cardiff are: Marseilles, $1.40; Genoa or Naples, $1.44; Singapore, $2.52; Las Palmas, $1.50; St. Vincent, $1.62; Rio Janeiro, $2.16; Santos, $2.64; Buenos Ayres, $1.92.

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## IRON TRADE REVIEW.

New York, July 23.

The iron market continues to show very little change in conditions. Large interests are still holding back, and new business has been practically absent from the market. Manufacturers continue very busy, but most of them have contracts for raw material running up to the end of the third quarter, and nobody seems disposed at the present time to do anything for the fourth quarter. The situation in Wall Street has some effect upon the market, but the chief reason for present conditions is the conviction that a lower range of prices must be reached, and the reluctance of buyers to place orders as long as there is any prospect of a fall.

It must be admitted that they have encouragement in this feeling. As we have already noted, substantial concessions have been made in the Southern pig iron, $1.50 being about the amount of reduction. Concessions have also been made by the Northern furnaces, although it has been done more quietly. There is little doubt that many makers would be willing to accord substantial reductions on large contracts, but purchasers do not feel satisfied that the bottom has been reached.

In finished materials the situation is practically the same. No new orders have been placed. Almost without exception, the mills have orders carrying them well up to the end of September; but beyond that there is an uncertainty, and a disposition to quote lower prices for the sake of securing business. In some lines there is a little more activity. Plate-makers are doing well, and, in structural material, specifications on contracts are coming in much more freely than they have been for some time past. Nails and other building material also show an improved demand.

The rail market seems to be an exception to all rules. The rail mills will carry over a considerable amount on this year's contracts, and already a number of large orders have been given for 1904 delivery. This week has shown a large addition to these orders. A notable fact is that a considerable quantity of business is going to the Tennessee Coal, Iron & Railroad Company, whose new rail mill, at Ensley, will have plenty of work for the coming year. In view of this, the company has ordered a lot of new machinery for the mill, and is increasing its facilities for making steel.

Exports of pig iron from Great Britain to the United States for the six months ending June 30 were 260,812 tons against 81,903 tons in 1902; exports of steel ingots and billets to the United States this year were 9,884 tons; none were reported last year.

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**Birmingham.** July 20.

(*From Our Special Correspondent.*)

Notwithstanding the decided reduction made in pig iron quotations at Chicago week before last, by the Southern Association furnaces, there has been but a slight improvement in the buying. There are more sales being made, and the aggregate is a little better than it was before this last reduction, but it is apparent that the consuming element is still playing the waiting game, and mention has been made of a still further reduction. The furnacemen hereabouts do not believe that another reduction is going to be made as fast as some would think, though it is admitted, ten days after the last reduction, that there is some disappointment at the buying not picking up, as it was believed it would. No. 3 foundry, at $13, does not appear to be very strong bait, and consumers are buying only for their actual need and on quick delivery. The non-Association furnaces in this State do not appear to be underselling Association furnaces much, if any.

The following quotations prevail: No. 1 foundry, $14; No. 2 foundry, $13.50; No. 3 foundry, $13; No. 4 foundry, $12@$13; gray forge, $12@$12.50; No. 1 soft, $14; No. 2 soft, $13.50.

There is nothing being done at the rolling mills in this section. W. H. Hassinger, southern manager of the Republic Iron & Steel Company, when asked when the Birmingham and Gate City rolling mills would likely resume operations, stated that just as soon as there was a better demand for the finished iron and steel. The Bessemer rolling mills, belonging to the Tennessee Coal, Iron & Railroad Company, will during this week probably come to some agreement as to plate mill wages, the president of the Amalgamated Association of Iron, Steel & Tin Workers being expected in this district this week. The rolling mills in this district have considerable stock on hand, and all orders are beng attended to. Bar iron prices are off some, the meeting in Chattanooga recently deciding on some reductions. This, however, has not aroused a very great buying movement. As to the steel plant at Ensley, good reports are still made as to production and sale of product. The steel rail department at this institution is in steady operation. President Don H. Bacon, of the Tennessee Company, has decided on some extensive improvements at the steel mills. A converter will be added to the Ensley mill.

The plant of the Alabama Steel & Wire Company is still idle, and there are no prospects of an early resumption of work. Mr. E. T. Schuler, of the company, during the past week announced that there would hardly be a resumption of work at the plant until the company was manufacturing its own steel at Gadsden. This will hardly be until after January 1, 1904, as there is much work yet to be done at this point.

T. A. Gillespie, of West Orange, N. J., was during the past week appointed receiver for the Southern Car & Foundry Company, a concern owning and operating car plants in Anniston and Gadsden, Ala., Lenoir City and Memphis, Tenn. The statement is made that there is some contention among the stockholders. Numerous attachment suits have been filed against the corporation, and efforts are being made to declare the concern bankrupt. Representatives of receivers and of the larger stockholders are now in Birmingham, the general headquarters of the concern investigating the papers and effects of the company. The company has no bonded indebtedness, but a large floating debt.

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**Chicago.** July 20.

(*From Our Special Correspondent.*)

No change of importance marks the market for pig iron. Sales are small, confined to immediate delivery and only caused, apparently, by the buyer's necessities. The feeling that the market is going down steadily prevails with buyers and sellers. When the end will come, no one of authority will prophesy. The price of $13.50 Birmingham or $17.85 Chicago for No. 1, fixed by the Southern Association a week ago, is laughed at by independent furnace agents; according to their declarations, this action followed rather than led the market. It is undoubtedly a fact that this price does not represent the market now; the consumer who really wants iron can get it at $1@$2 under the Association price.

Coke continues plentiful; spot sales hover about $5, and the restriction of shipments decided upon last week does not yet affect this market materially. Contract coke is almost without seekers, at $6@$6.50.

**Cleveland. July 21.**

*(From Our Special Correspondent.)*

*Iron Ore.*—The lake situation is unchanged. Boats are still delayed several days at unloading docks, and the movement is slow. The demand for vessels, and the supply of them, counterbalance each other. There is a slight call for more ore but no sales have been made. The rates of carriage remain: 80c. from Duluth; 70c. from Marquette, and 60c. from Escanaba for wild cargoes. The prices hold at $4.50 for bessemer old range and $4 for bessemer Mesabi.

*Pig Iron.*—The buying of foundry is confined to single carload or 100-ton lots with very little inquiry, even for future delivery material. The market is very dull and listless and there seems to be nothing immediately ahead to change the aspect of the situation. The call for Southern iron brings out the fact that non-association stacks are again cutting under the association prices and that $13, Birmingham, has been offered in this territory. Southern Ohio furnaces have met the price asked by the Valley furnaces, namely $18 in the Valley. The call for gray forge and malleable iron is much heavier than it was, with prices holding as they were, respectively $18 and $18.50 in the Valley. The inquiry for bessemer and basic has all but ceased and the market is extremely dull. Very little interest is being taken as yet in fourth-quarter material. The prices hold nominally at $18.50, Valley furnace for bessemer and $18.75 for basic. In all lines production has been very heavy and the encouraging feature has been that consumption has kept pace with the enormous production, no stocks having been collected of any consequence.

*Finished Material.*—The call for structural has been heavier, especially out of stock. The odd sizes being rather scarce, the jobbers are having the busiest time of the year filling these orders. This is taken as ample evidence that the consumption of this material has gone on steadily, regardless of the seeming light demand in the way of new orders. Jobbers are getting 2.15c., Cleveland, but the mills are confining themselves to 1.60c., Pittsburg. Plates have been weak, with no demand to speak of. The small mills are content with 1.18@1.85c., Cleveland. The large mills offer deliveries in three weeks, at 1.60c., Pittsburg. Sheets have been stronger than all of the rest of the market. The prices have not changed, being 3.05c. for No. 27 black sheets out of stock as a basis, and 4c. out of stock for galvanized sheets as a basis. The mills are reporting good business with plenty to do, except the smaller mills which occasionally cut the prices. The bar iron price is very uncertain with varying quotations. The market is dull. One sale was reported this week, but the price was withheld. The general impression is that business is being done at 1.65@1.70c., Youngstown. The bar steel trade has been easier, with no great rush of business, the larger interests still withholding their orders. The market has been steady at 1.60c., Pittsburg. Billets have been in small demand only at $28.50@$29, Pittsburg, for bessemer, the selling being done by outside concerns. Nothing is being done in rails.

*Old Material.*—The market is sagging, with prices very soft, and nothing of any importance being done.

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**New York. July 23.**

*Pig Iron.*—Business shows little improvement. Quotations vary, according to brand, etc. For Northern iron at tidewater prices are: No. 1X foundry, $18.25@$19.25; No. 2X, $17.25@$18.25, while No. 2 plain can be had for 50c. less; gray forge, $16.75@[illegible]. For Southern iron, on dock, quotations are: No. 1 foundry, $18.25; No. 2, $17.75; No. 3, $17.25; No. 1 soft, $18.

*Plates.*—Business is still quiet and sales are in small lots. Prices are unchanged. Sheared plates are quoted as follows: Tank ¼-in. and heavier, 1.80@2c.; flange, 2@2.05c.; marine, 2.10@2.20c.

*Bar Iron and Steel.*—Prices for large lots on dock are: Refined bars, 1.80@1.90c.; soft steel bars, 1.75@1.90. Trade is chiefly of a retail order.

*Pipes and Tubes.*—Retail demand is better, but business is chiefly in small lots.

*Structural Material.*—Inquiries are improving on account of the settlement of the building trade strikes. For large lots at tidewater, nominal quotations continue 1.75@2c. for beams, angles, channels and tees. The usual advance is asked for small lots out of stock.

*Steel Rails.*—The quotation remains $28 for standard sections, f. o. b. mills; light rails, $33@$36, according to weight. Relaying rails are $28@$30 for heavy sections and $33@$35 for light sections. Demand for rail-fastenings is good.

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**Philadelphia. July 22.**

*(From Our Special Correspondent.)*

*Pig Iron.*—The only transactions are for small lots. Buyers cannot be induced to take hold in a large way. Some eastern furnace companies are considering the advisability of blowing out, but in trade circles it is not believed that this course will be adopted. A heavy consumption is in progress and each week furnishes some evidences that there is a gradual increase. The most interest is felt in No. 2 foundry and $18 is the usual figure quoted; but buyers expect to do better. No. 2 plain has sold at $17.26; gray forge is still held at $18; for best, and $17 for ordinary; basic is quoted at $17.75.

*Steel Billets.*—The downward tendency in steel billets is a feature of the market. Some vigorous efforts have been made on the part of manufacturers to meet the views of large consumers, but without avail. The only business that has been done this week has been in small lots at $28 for bessemer. The buying interests will not enter into long engagements.

*Bar Iron.*—Some of the bar iron mills have resumed work, but not with that volume of business on the books which the managers desire. There have been no further reported concessions. Refined iron is quoted at 1.65 delivered; and steel bars at 1.60@1.70c.

*Sheets.*—The sheet business has shown more signs of vitality in a retail way than any other branch of the industry, excepting pipes and tubes. The larger consumers of sheets have pursued a very conservative course since the first of the year and now they are quietly placing orders, some of them quite large, especially for heavy sheets and galvanized. The resumption of work by some strikers is partly responsible for this improvement in sheets.

*Pipes and Tubes.*—The latest developments in this branch are of a favorable character. It was reported this week that, notwithstanding the heavy demands, certain large buyers had succeeded in obtaining concessions in western Pennsylvania mills. This fact, if true, has no bearing upon the average retail business that is coming to us in the east.

*Skelp Iron.*—It is said that there is a great deal of skelp business in the background, but there is but little evidence of it in the foreground. A large amount of business has been secured by skelp mills outside of this district, but our mills seem to have to be content with the fag ends.

*Merchant Steel.*—The only additional news within a week is that a number of large New England consumers have found it to their interest to become buyers and it is believed their orders are of considerable magnitude, though there are no means of verifying the fact. The consumption of merchant steel is quite heavy in both western and eastern markets and while capacity has been very largely increased, the management seem able to hold their own with buyers.

*Nails.*—The retail trade in nails is more active than for several weeks, owing in a measure to the resumption of work.

*Plates.*—The plate makers are more interested in the possibilities of securing a large amount of work for forward delivery than in current business. There seems to be a determination among makers to stand by their guns, which they are doing so far as retail trade goes. We hear this week of a number of possibilities for big business in plates, but there is no assurance that the intending buyers will cover their needs before August. Carload lots of ¼-in. plate are quoted at 1.75c., flange 1.90c., marine 2c., and in small lots fire-box sold at 2.30@2.40c.

*Structural Material.*—Current business does not possess interesting features. The customary quotations are repeated.

*Steel Rails.*—It is intimated here that some Canadian and Pacific Coast roads, which have recently made purchases abroad, contemplate increasing their orders. Large orders have been placed at home by home companies and the available capacity for the first quarter of next year at the present rate of procedure will soon be filled up.

*Old Rails.*—Old rails are quoted at $19.50 for steel and $22 for iron.

*Scrap.*—Choice railroad is wanted at $19; country scrap is held at $18.50; heavy steel scrap is held in small lots by two or three dealers at $20, but there are no buyers above $19. Comparatively little business is being done.

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**Pittsburg. July 21.**

*(From Our Special Correspondent.)*

The iron and steel markets continue dull, but prices are firm in all finished lines, and there is no indication of a decline. The United States Steel Corporation and other leading interests have business booked for the rest of the year. It is possible that pig iron will be shaded somewhat for late delivery, but it is not at all likely that a serious cut will be made. There is no demand at present and furnaces are not offering any iron or holding out inducements to consumers. It is difficult, therefore, to make any accurate quotations in the absence of sales. Indications pointed to a beginning of a buying movement for fourth-quarter iron when the Southern furnaces recently made the third schedule of prices since April 1, again reducing the rates. This action is partially responsible for the continued delay in buying foundry iron, but the threatened strike of the iron molders had a great deal to do with consumers keeping out of the market. A number of small sales of Northern foundry iron are reported to-day at prices around the Southern figure. The latest quotation of Southern foundry No. 2 is $13.50, Birmingham. The freight to Pittsburg is $4.85, making the price here $18.35. The Northern product can now be bought at that price, but the market may become stronger when the foundries begin to buy. Northern iron is preferred here to the Southern product.

None of the mills that closed for repairs remained idle longer than was absolutely necessary to get them in shape, and several that were shut down on July 1 are again in operation. Little new business is being received, but specifications against contracts are very satisfactory. The most active line of finished products is steel rails. After a brief stop, buying resumed last week when orders aggregating about 75,000 tons were placed. Fully one-third of the tonnage booked last week went to the Tennessee Coal, Iron & Railroad Company and will be rolled at the Ensley plant. So far about 700,000 tons of steel rails have been contracted for to be delivered in 1904, and it is not likely that less than 400,000 tons will be carried over from this year. The remarkable demand for merchant pipe continues and most of the mills are filled up for the rest of the year in 10-in., and larger. Heavy orders for smaller sizes have been booked and some mills are behind in deliveries.

The Amalgamated Association of Iron, Steel & Tin Workers has another strike on hand and although a comparatively small one, it is being vigorously prosecuted. The trouble is at the Port Vue 10-mill plant of the McKeesport Tin Plate Company, and was caused by the refusal of the company to sign the scale and operate the works under Amalgamated Association conditions. Several members of a new lodge formed there were discharged for violating a verbal agreement not to attempt to enforce Amalgamated rules at the works. That the firm is not antagonistic to organized labor was shown when the scale of the Tin Workers' International Protective Association was signed. The members of this union are employed in the tin-house and finish the plates. The plant was idle on Saturday on account of the strike, but new men were engaged and it is now almost in full operation. The tin-housemen will not support the Amalgamated in the fight.

There is no change in the iron molders' situation. Definite information has not been given out as to the result of the executive board meeting in Cincinnati, but it is believed here that a strike in the Pittsburg district was not approved.

*Pig Iron.*—There have been no sales of bessemer pig iron and but few inquiries have been received. The Valley furnaces quote $18.50@18.75, at the furnaces, but it is probable this price could be shaded. A number of small lots of foundry No. 2, aggregating about 1,000 tons, were sold yesterday at prices ranging from $18.25 to $18.50, Pittsburg. Gray forge is quiet and it is likely that $17.50, Pittsburg, can be done.

*Steel.*—There has been some business done in bessemer billets, but no orders of any consequence have been booked. The price of $28 at mill is unchanged. The plate market is stronger, a fair tonnage having been placed during the week. The price is firm at 1.60c.

*Sheets.*—There is a marked improvement in sheets. Stocks in jobbers' hands have been greatly depleted which has forced further buying. The official price for No. 28 gauge black sheets remains at 2.75c. and 3.85c. for galvanized.

*Ferro-Manganese.*—Domestic 80 per cent. is still out of the market and the foreign product is quoted at $50@52.50.

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**Cartagena, Spain.**

*(Special Report of Barrington & Holt.)*

*Iron and Manganiferous Ores.*—Shipments for the week were one cargo, 3,800 tons dry ore to Great Britain; one cargo, 2,200 tons manganiferous ore to Great Britain; one cargo, 5,400 tons Calasparra magnetic to Rotterdam. The ore trade has shown little variation, and there is no change in prices, although freight rates remain favorable. The demand for manganiferous ores, especially, is very light.

Prices are firm at 6s. 9d.@7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. 6d. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

*Pyrites.*—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 10s. 6d. per ton, f. o. b. Cartagena. The only shipment for the week was 380 tons to Genoa, Italy.

## CHEMICALS AND MINERALS.

(See also Prices-Current, page 148.)

New York, July 22.

The market continues generally quiet, and changes in prices have not been important. Buying is light, and the influence of the holiday season is felt.

*Cyanide of Potassium.*—At New York sellers quote on the basis of 20c. per lb., but this price may be shaded on a desirable order.

*Bleaching Powder.*—In the absence of business, prices are nominally unchanged at $1@$1.12½ per 100 lbs., f. o. b. New York for good imported bleach, and 75c.@$1, f. o. b. works for domestic.

*Copper Sulphate.*—Makers are at odds, and as business is small, prices are easy. Some sellers ask $4.37½@$4.50 per 100 lbs., f. o. b., while others hold for $4.75. Of course, each tries to uphold his own market price, but consumers are chary and look for more advantageous terms.

*Acids.*—Commercial acids are moving in a moderate way, though at times sulphuric acid orders are more urgent, owing to the improvement in the soda water trade. Prices continue unchanged.

We quote as below, per 100 lbs., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

| | | | |
|---|---|---|---|
| Muriatic, 18° | $1.50 | Oxalic, Com'l | $5.25@$5.50 |
| Muriatic, 20° | 1.60 | Sulphuric, 50°, bulk, ton | 13.50@14.50 |
| Muriatic, 22° | 1.75 | Sulphuric, 60° | 1.05 |
| Nitric, 36° | 4.37½ | Sulphuric, 60° bulk, ton | 18.00@20.00 |
| Nitric, 38° | 4.75 | Sulphuric, 66°, | 1.20 |
| Nitric, 40° | 5.00 | bulk, ton | 21.00@23.00 |
| Nitric, 42° | 5.37½ | | |

*Brimstone.*—Spot best unmixed seconds are quoted at $22.37½@$22.50 per long ton, and shipments at $22.25—prices that leave a good margin on the actual cost of importing. Best thirds are about $1 less than seconds.

*Pyrites.*—Prices for both domestic and foreign pyrites vary little as deliveries are being made on long-time contracts.

We quote: Domestic pyrites, $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites, carrying from 46@52 per cent sulphur, are quoted at 11@12c. per unit for lump and 10@10½c. for fines, delivered at Atlantic ports.

*Nitrate of Soda.*—The market is a little more active, and prices are firm in all positions, owing to a higher coast market. Spot is quoted at $2.05 per 100 lbs., and futures, $2. Ocean freights continue strong, as the amount of disengaged tonnage is small, and with the approach of the European shipping season nitrate of soda is likely to go higher.

European statistical position in June showed deliveries of only 43,040 long tons, the smallest quantity in six months. From January to June, inclusive, deliveries amounted to 618,990 tons, which compares with 742,850 tons last year, showing a decrease of 123,860 tons. The visible supply on July 1, 1903, including stocks and cargoes afloat, was 251,420 tons, which is the smallest quantity reported in a long while, and is 92,480 tons less than July 1, 1902.

*Sulphate of Ammonia.*—Good gas liquor is in better request, and holders ask $3.15@3.17½ per 100 lbs., according to position.

*Phosphates.*—Market firm; shipments good, considering the higher prices asked by high-grade rock people. Further contracts booked for export in the first half of 1904; all at advanced prices.

Tampa shipments of rock in June were 8,275 tons, making 34,030 tons for the half-year, against 23,390 tons in 1902; increase, 10,640 tons.

Peace River (Fla.) pebble shipments in June 19,170 tons, making 29,015 tons since January, against 3,070 tons in the corresponding six months last year, when the plant was shut down owing to the fire.

Tennessee and South Carolina rock and Florida pebble miners are all enjoying a fairly good business, and like the Florida high-grade rock miners, are holding for higher prices.

| Phosphates. | Per ton, F. o. b. | United Kingdom or European Ports. Unit. | Long ton. |
|---|---|---|---|
| *Fla. hard rock (77@80%) | $7.00@$7.50 | 7¼@7¾d. | $11.31@12.09 |
| *Fla. land peb. (68@73%) | 3.50@ 3.75 | 5½@5¾d. | 7.70@ 8.05 |
| †Tenn., (78@82%) export | 4.00@ 4.25 | •6½@7d. | 10.40@11.20 |
| †Tenn., 78% domestic | 3.75@ 4.00 | ..... | ..... |
| †Tenn., 75% domestic | 3.50 | ..... | ..... |
| †Tenn., 73@74% domestic | 2.95@ 3.20 | ..... | ..... |
| †Tenn., 70@72% domestic | 2.70@ 2.95 | ..... | ..... |
| ‡So. Car. land rock | ...@ 3.25 | ..... | ..... |
| ‡S. Car. riv. r'k (55@66%) | 2.75@ 3.00 | 5¼@5¾d. | 5.95@ 6.53 |
| Algerian (63@70%) | ..... | 5½@6¼d. | 7.37@ 8.38 |
| Algerian (58@63%) | ..... | 5¼@6d. | 6.30@ 7.20 |
| Gafsa (Tunis) | ..... | 5¼@6d. | 6.30@ 7.20 |
| Christmas Isl. (80%85%) | ..... | 7¼@7¾d. | 12.04@12.87 |

*Fernandina, Tampa, Brunswick, Savannah or Port Inglis. †Mt. Pleasant. ‡On vessels, Ashley River.

## METAL MARKET.

New York, July 23.

### Gold and Silver Exports and Imports,

At all United States Ports in June and Year.

| Metal | June. 1902. | June. 1903. | Year. 1902. | Year. 1903. |
|---|---|---|---|---|
| Gold: | | | | |
| Exports | $391,525 | $12,507,588 | $20,276,237 | $31,327,483 |
| Imports | 4,086,457 | 4,767,553 | 13,187,344 | 15,368,199 |
| Excess | E. $3,694,932 | E. $7,740,035 | E. $7,088,893 | E. 15,959,284 |
| Silver: | | | | |
| Exports | $3,250,066 | $1,551,410 | $22,528,034 | $17,426,973 |
| Imports | 1,802,853 | 2,050,805 | 12,220,738 | 10,340,798 |
| Excess | E. $1,447,213 | E. $499,395 | E. $10,307,296 | $7,086,175 |

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Treasury Department.

### Gold and Silver Exports and Imports, New York.

For the week ending July 22, and for the years from January 1:

| Period. | Gold. Exports | Gold. Imports. | Silver. Exports. | Silver. Imports. | Total Excess, Exports or Imports. |
|---|---|---|---|---|---|
| Week | $339,451 | $12,115 | $690,706 | $2,741 | E. $1,015,301 |
| 1903 | 32,150,932 | 3,574,059 | 11,284,247 | 1,170,508 | E. 38,654,612 |
| 1902 | 19,194,360 | 1,325,181 | 14,665,915 | 760,974 | E. 31,773,820 |
| 1901 | 25,774,704 | 2,601,906 | 18,808,442 | 2,212,449 | E. 40,768,791 |

The gold exported this week went chiefly to France and Germany; the silver to London and France. The gold imports were principally from Cartagena, Colon and South America, the silver from Vera Cruz and Colon. To the year's total of silver exports are added shipments too late for preceeding week.

The stock exchanges continue depressed, and securities of all classes have been dropping continuously in price; in some cases reaching very low quotations. This condition is referred to in our editorial columns. The effect on general business, while it is perceptible, is less than might have been expected, and trade continues in fair condition. No gold exports are noted this week.

The statement of the New York banks, including the 56 banks represented in the Clearing House, for the week ending July 10, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

| | 1901. | 1902. | 1903. |
|---|---|---|---|
| Loans and discounts | $856,198,500 | $903,327,300 | $907,015,500 |
| Deposits | 939,145,300 | 940,692,900 | 895,208,100 |
| Circulation | 30,710,100 | 31,809,600 | 43,908,900 |
| Specie | 177,501,800 | 173,168,700 | 160,863,400 |
| Legal tenders | 38,313,900 | 77,713,800 | 76,217,100 |
| Total reserve | $255,815,700 | $250,882,500 | $237,080,500 |
| Legal requirements | 234,786,325 | 235,173,225 | 223,802,025 |
| Balance surplus | $21,029,375 | $15,709,275 | $13,278,475 |

Changes for the week were increases of $5,270,000 in surplus reserve, $4,190,300 in specie, $1,845,900 in legal tenders, and $3,064,800 in deposits; decreases of $2,513,500 in loans and $1,800 in circulation.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings at the corresponding date last year:

| | 1902. Gold. | 1902. Silver. | 1903. Gold. | 1903. Silver. |
|---|---|---|---|---|
| N. Y. Ass'd. | $170,597,600 | ..... | $160,863,400 | ..... |
| England | 190,444,770 | ..... | 182,984,925 | ..... |
| France | 514,736,285 | $223,842,245 | 502,894,645 | $224,525,150 |
| Germany | 187,590,000 | 69,380,000 | 163,850,000 | 57,570,000 |
| Spain | 70,895,000 | 97,805,000 | 72,860,000 | 102,500,000 |
| Neth'l'ds | 24,249,500 | 33,501,000 | 19,700,000 | 32,741,500 |
| Belgium | 15,526,655 | 7,763,335 | 14,900,000 | 7,450,000 |
| Italy | 80,935,000 | 10,314,500 | 93,460,000 | 11,669,000 |
| Russia | 369,345,000 | 44,115,000 | 396,630,000 | 45,325,000 |
| Austria-Hungary | 219,765,000 | 63,220,000 | 225,935,000 | 65,215,000 |

The returns of the Associated Banks of New York are of date July 18, and the others July 16, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Shipments of silver from London to the East for the year up to July 9 are reported by Messrs. Pixley & Abell's circular, as follows:

| | | | | |
|---|---|---|---|---|
| India | £3,631,445 | £3,285,425 | D. | £346,020 |
| China | 63,440 | 220,918 | I. | 157,478 |
| The Straits | 70,550 | 421,779 | I. | 351,229 |
| Total | £3,765,435 | £3,928,122 | I. | £162,687 |

Imports for the week were £130,000 from New York, £2,000 from Chile and £11,000 from the Cape of Good Hope. Exports included £40,900 in bar silver to India, and £57,200 in Mexican dollars to the Straits.

Indian exchange is slighty easier; nevertheless, the India Council insisted upon a rate of 16d. per rupee for bills, and all the bills offered for sale in London were taken at that rate. The position of the Indian banks is rather strong, and the demand for remittance is falling off. Purchases of silver for India, which showed a slight increase last week, are again light. There is some demand, however, for silver for remittance to the Straits.

The silver market experienced a sharp advance the past week, based on small demand from India, and covering of July contracts by London brokers. Future silver continues at a considerable discount from spot delivery.

The United States Assay Office in New York reports receipts of 97,000 oz. silver for the week.

The foreign merchandise trade of Great Britain for the six months ending June 30 is valued by the Board of Trade returns as below:

| | 1902. | 1903. |
|---|---|---|
| Imports | £262,740,088 | £260,529,889 |
| Exports | 168,194,416 | 178,570,493 |
| Excess, imports | £94,545 672 | £81,959,396 |

This shows a decrease of £2,210,199, or 0.9 per cent. in imports, an increase of £10,376,077, or 5.8 per cent. in exports, and a resulting decrease of £12,586,276 in the excess of imports.

The movement of gold in Great Britain for the six months ending June 30 was as follows:

| Gold: | 1902. | 1903. | Changes. |
|---|---|---|---|
| Imports | £10,624,514 | £13,656,327 | I. £3,031,813 |
| Exports | 4,458,695 | 7,602,116 | I. 3,143,421 |
| Excess, imports | £6,165,819 | £6,054,211 | D. £111,608 |

The increase in receipts this year was from South Africa chiefly.

### Prices of Foreign Coins.

| | Bid. | Asked. |
|---|---|---|
| Mexican dollars | $0.42½ | $0.44 |
| Peruvian soles and Chinese pesos | .39 | .42 |
| Victoria sovereigns | 4.86 | 4.88 |
| Twenty francs | 3.86 | 4.88 |
| Spanish 25 pesetas | 4.78 | 4.82 |

## OTHER METALS.

### Daily Prices of Metals in New York.

| July. | Sterling Exchange. | Silver—N. Y. Cts. | Silver—London Pence. | Copper—Lake, Cts. per lb. | Copper—Electrolytic, Cts. per lb. | Copper—London, £ per ton. | Tin, Cts. per lb. | Lead Cts. per lb. | Spelter—N. Y. Cts. per lb. | Spelter—St. L., Cts per lb. |
|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 4.86½ | 53⅝ | 24¾ | 13@13½ | 13@13¼ | 56 | 27 | 4.05 @4.10 | 5.65 @5.70 | 5.50 @5.55 |
| 17 | 4.86 | 53⅞ | 24⅞ | 13 @13½ | 12¾ @13¼ | 56½ | 27 | 4.05 @4.10 | 5.65 @5.70 | 5.50 @5.55 |
| 18 | 4.86 | 54⅛ | 25 | 13 @13¼ | 12¾ @13¼ | .... | 27 | 4.05 @4.10 | 5.65 @5..0 | 5.50 @5.55 |
| 20 | 4 86 | 55¼ | 25⅛ | 13 @13¼ | 12¾ @13 | 56½ | 27¼ | 4.05 @4.10 | 5.65 @5.70 | 5.50 @5.55 |
| 21 | 4.85 | 55 | 25 7/16 | 13 @13¼ | 12¾ @13 | 55¾ | 27¼ | 4.05 @4.10 | 5.65 @5.70 | 5.50 @5.55 |
| 22 | 4.86 | 54⅞ | 25⅜ | 13 @13¼ | 12¾ @13 | 56 | 27¼ | 4.05 @4.10 | 5.65 @5.70 | 5.50 @5.55 |

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars: the price of electrolytic cathodes, is usually 0.25 lower than these figures.

*Copper.*—The market remains dull and depressed, owing to the continued liquidation on the Stock Exchange, which is undermining confidence to a large extent. Under the circumstances, the news regarding the settlement of the various building strikes has had no effect whatsoever, and prices are again reported lower at 13@13¼c. for lake; 12¾@13c. for electrolytic in cakes, wirebars or ingots; 12½@12¾c. for cathodes and 12¼@12½c. for casting copper.

Exports and imports of copper at New York, Philadelphia and Baltimore in the week of July 21, and for the year to date were, in long tons:

| | Week. | Year. |
|---|---|---|
| Exports: | | |
| Austria | .... | 2,027 |
| Belgium | .... | 847 |
| France | .... | 11,098 |
| Germany | 873 | 14,074 |
| Holland | 665 | 21,402 |
| Italy | 100 | 1,552 |
| United Kingdom | 153 | 9,157 |
| Other countries | .... | 3,477 |
| Total copper | 1,791 | 65,634 |
| Matte | .... | 286 |
| Imports: | | |
| Copper | 974 | 15,457 |
| Matte | .... | 984 |
| Ore | 2,846 | 13,996 |

Exports for the week show an increase, especially those to Germany.

The market in London for standard copper, which last week closed at £56 10s., opened on Monday at the same price, declined on Tuesday to £55 15s., and the closing quotations on Wednesday are cabled as

£56 2s. 6d. for spot and £55@£55 2s. 6d. for three months prompt.

Refined and manufactured sorts we quote: English tough, £60@£60 10s.; best selected, £61@£61 10s.; strong sheets, £69@£70; India sheets, £66@£67; yellow metal, 6⅛@6¼d.

Statistics for the first half of July show a decrease in the visible supplies of 42 tons.

Imports and exports of copper in all forms in Great Britain, for the six months ending June 30, are reported as below, in long tons; the totals giving approximate contents in fine copper:

| | 1902. | 1903. | Changes. | |
|---|---|---|---|---|
| Copper ore | 47,717 | 43,719 | D. | 3,998 |
| Matte and precipitate | 39,883 | 38,015 | D. | 1,868 |
| Fine copper | 54,148 | 29,768 | D. | 24,380 |
| Total, fine copper | 78,862 | 53,148 | D. | 25,714 |
| Exports | 25,420 | 26,403 | I. | 983 |
| Balance | 53,442 | 26,745 | D. | 24,697 |

Of the imports this year 327 tons of ore, 2,504 tons of matte, and 9,614 tons of fine copper were from the United States; against 379 tons ore, 9,889 tons matte and 29,851 tons fine copper last year.

*Tin* has been quiet and steady throughout the week, without any special feature. The closing quotations are 27¼c. for spot and 26¾@27c. for futures.

The foreign market, which last week closed at £122 15s., opened on Monday at £123 10s.; advanced on Tuesday to £124 10s., and the closing quotations on Wednesday are cabled as £123 10s@£123 12s. 6d. for spot and £123 15s.@£123 17s. 6d. for three months.

Imports of tin into Great Britain, with re-exports of foreign tin, for the six months ending June 30, are reported as follows, in long tons, of 2,240 lbs.:

| | 1902. | 1903. | Changes. | |
|---|---|---|---|---|
| Straits | 12,813 | 10,673 | D. | 2,140 |
| Australia | 1,475 | 2,083 | I. | 608 |
| Other countries | 1,448 | 1,210 | D. | 238 |
| Total imports | 15,736 | 13,966 | D. | 1,770 |
| Re-exports | 11,148 | 10,650 | D. | 498 |
| Net imports | 4,588 | 3,316 | D. | 1,272 |

Re-exports were largely to the United States. The metal from other countries is chiefly Bolivian tin.

*Lead* continued in good demand and full prices are being paid especially for prompt shipment. The ruling quotations are given as 4@4.02½ St. Louis, and 4.05@4.10, New York.

The foreign market is steady, Spanish lead being quoted £11 8s. 9d. and English lead 2s. 6d. higher.

Imports and exports of lead in Great Britain, for the six months ending June 30, were as follows, in long tons of 2,240 lbs.:

| | 1902. | 1903. | Changes. | |
|---|---|---|---|---|
| United States | 28,968 | 18,532 | D. | 10,436 |
| Spain | 49,272 | 49,795 | I. | 523 |
| Australia | 30,964 | 31,211 | I. | 247 |
| Other countries | 7,738 | 11,541 | I. | 3,803 |
| Total imports | 116,942 | 111,079 | D. | 5,863 |
| Exports | 17,181 | 16,380 | D. | 801 |
| Balance | 99,761 | 94,699 | D. | 5,062 |

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

*Spanish Lead Market.*—Messrs. Barrington and Holt report from Cartagena, Spain, under date of July 4, that the price of silver during the week was 13.25 reales per oz. Exchange rose 9 points, making it 34.44 pesetas for £1. The local quotation for pig lead on wharf has been 65.75 reales per quintal, which, on current exchange, is equal to £10 13s. per ton of 2,240 lb., f. o. b. Cartagena. Shipments included 200,000 kgs. soft lead to Swansea and 63,700 kgs. to Marseilles.

*Spelter* remains very firm indeed, with a good inquiry for galvanizing as well as brass purposes. Spot metal is rather scarce and commanding a premium. At the close we quote 5.50@5.55 St. Louis and 5.65@5.70 New York.

The foreign market is steady, good ordinaries being quoted at £20 15s., and specials at £21. We notice in our last issue that we stated this quotation to be £23 15s.@£24, respectively, which was a mistake and ought to have read £20 15s.@£21.

Imports of spelter into Great Britain, for the six months ending June 30, were 43,499 long tons, against 46,758 tons for the first half of 1902. Imports of zinc manufactures were 10,810 tons, against 10,946 tons last year. Exports of spelter for the half-year were 3,777 tons, against 4,286 tons last year.

*Spanish Zinc Ore Market.*—Messrs. Barrington and Holt report from Cartagena, Spain, under date of July 4, that business in zinc ores remains depressed. Buyers are offering 8 to 9 reales per quintal, on basis of 30 per cent zinc; but the principal mine owners have combined and refuse to listen to any offer under 10 reales. The latter price, however, seems too high for current prices of spelter. Shipments during the week were 1,631 tons of blende to Antwerp.

*Antimony* is dull and is pressed for sale. Cookson's at 7¼@7½c.; Hallett's 6⅜@6½c.; Hungarian, Japanese, U. S. Star, Italian and French 6¼@6⅜c.

*Nickel.*—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

*Platinum.*—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

*Quicksilver.*—The New York price is unchanged at $47.50 per flask for large lots, with a slightly higher figure quoted for smaller orders. The San Francisco quotations are still $44.50@$46 per flask for domestic orders, and $42@$43 for export. The London price is £8 12s. per flask, with the same quotation asked by second hands.

Imports of quicksilver into Great Britain for the six months ending June 30 were 2,480,401 lbs., against 2,368,141 lbs. in the first half of 1902. Re-exports of foreign metal were 898,819 lbs., against 943,572 lbs. last year.

*Minor Metals and Alloys.*—Wholesale prices, f. o. b. works, are as follows:

| Aluminum. | Per lb. | | Per lb. |
|---|---|---|---|
| No. 1 99% ingots | 33@37c. | Ferro-Tungsten (37%) | 28c. |
| No. 2 90% ingots | 31@34c. | Magnesium | $2.75 |
| Rolled Sheets | 4c. up | Manganese, pure (N. Y.) | 60c. |
| Alum-bronze | 20@23c. | Mangan'e Cop. (20% Mn) | 32c. |
| Nickel-alum | 33@39c. | Mangan'e Cop (30% Mn) | 38c. |
| Bismuth | $2.10 | Molybdenum (Best) | $1.82 |
| Chromium, pure (N.Y.)—80c. | | Phosphorus, foreign | 45c. |
| Copper, red oxide | 50c. | Phosphorus, American | 70c. |
| Ferro-Molyb'um (50%) | $1.25 | Sodium metal | 50c. |
| Ferro-Titanium (10%) | 90c. | Tungsten (Best) | 62c. |
| Ferro-Titanium (20@25% N. Y.) | 55c. | | |

Variation in prices depends on size of orders, deliveries, etc.

## Missouri Zinc Ore Market. July 18.

*(From Our Special Correspondent.)*

Ore prices remain unchanged, zinc being quotable at $40 for the highest, and $35@$37.50 per ton of 60 per cent zinc. Lead is $52 per ton. A year ago the top price of zinc was $42, and lead $48 per ton.

The shipment since the first of the year has been 13,585 tons less than for the corresponding period of last year; but if the past week's record of 5,537 tons is maintained, the output will soon reach last year's shipment, if not the output, which was in excess of the sales some 12,000 tons. Starting the year with that amount of surplus, it has been gradually reduced, until there is barely 3,000 tons left in the bins, and this is purchased pretty close. So far the lesser reserve has not affected prices, but it may at any time, as the purchasing agents were uncommonly active the past week in loading ore and laying bids on ore for next week's delivery.

George Braun, of Galena, informed the JOURNAL correspondent to-day that his new smelter at La Harpe would be in operation in about 30 days, and it was also learned that the new smelter at Chanute was expected to be started no later than September 1. With these additional smelters requiring ore a little later the outlook for an advancing ore market is certainly good.

Following are the shipments from the various camps of the Joplin District for the week ending to-day:

| | Zinc, lbs. | Lead, lbs. | Total Value. |
|---|---|---|---|
| Joplin | 3,065,720 | 318,100 | $64,485 |
| Webb City-Carterville | 1,932,450 | 420,320 | 44,535 |
| Galena-Empire | 1,056,020 | 88,460 | 20,750 |
| Duenweg | 973,870 | 118,130 | 20,600 |
| Alba-Neck | 722,700 | ..... | 13,370 |
| Reeds | 495,480 | ..... | 9,525 |
| Oronogo | 508,750 | 11,160 | 8,970 |
| Aurora | 592,230 | 7,130 | 8,645 |
| Zincite | 288,520 | 2,420 | 5,400 |
| Carthage | 274,840 | ..... | 5,360 |
| Prosperity | 250,700 | 14,610 | 5,020 |
| Granby | 323,000 | 28,000 | 4,820 |
| Cave Springs | 179,570 | 14,000 | 2,500 |
| Mitchell | 120,030 | 5,430 | 2,300 |
| Central City | 106,930 | 1,130 | 1,795 |
| Spurgeon-Spring City | 56,240 | 32,370 | 1,400 |
| Sarcoxie | 65,790 | ..... | 1,215 |
| Carl Junction | 61,810 | ..... | 1,145 |
| Ash Grove | ..... | 32,960 | 840 |
| Total sales | 11,074,650 | 1,094,220 | $222,675 |
| 29 weeks | 274,269,100 | 32,198,440 | $5,540,496 |

Zinc value, the week, $194,446; 29 weeks, $4,670,820. Lead value, the week, $28,229; 29 weeks, $869,676.

Compared with last week this week's shipment was 353 tons of zinc larger, 76 tons of lead less, but in value $14,144 greater. Compared with the same week of last year the shipment was an increase of 725 tons of zinc, a decrease of 100 tons of lead, with an increase of $19,914 in value. For the 29 weeks of this year the zinc shipment has been 13,585 tons less, the lead shipment 1,174 tons less, but the value was greater by $397,629.

## Average Prices of Metals per lb., New York.

| Month. | Tin. 1903. | Tin. 1902. | Lead. 1903. | Lead. 1902. | Spelter. 1903. | Spelter. 1902. |
|---|---|---|---|---|---|---|
| January | 28.33 | 23.54 | 4.075 | 4.000 | 4.865 | 4.27 |
| February | 29.43 | 24.07 | 4.075 | 4.075 | 5.043 | 4.15 |
| March | 30.15 | 26.32 | 4.442 | 4.075 | 5.349 | 4.28 |
| April | 29.81 | 27.77 | 4.567 | 4.075 | 5.550 | 4.37 |
| May | 29.51 | 29.85 | 4.325 | 4.075 | 5.639 | 4.47 |
| June | 28.34 | 29.36 | 4.210 | 4.075 | 5.697 | 4.96 |
| July | .... | 28.38 | .... | 4.075 | .... | 5.27 |
| August | .... | 28.23 | .... | 4.075 | .... | 5.44 |
| September | .... | 26.60 | .... | 4.075 | .... | 5.42 |
| October | .... | 26.07 | .... | 4.075 | .... | 5.38 |
| November | .... | 25.68 | .... | 4.075 | .... | 5.18 |
| December | .... | 25.68 | .... | 4.075 | .... | 4.78 |
| Year | .... | 26.79 | .... | 4.069 | .... | 4.84 |

Note.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.861c.; for March, 5.174c.; for April, 5.375c.; for May, 5.469c.; for June, 5.537 c.

## Average Prices of Copper.

| Month. | New York. Electrolytic. 1903. | New York. Electrolytic. 1902. | New York. Lake. 1903. | New York. Lake. 1902. | London. Standard. 1903. | London. Standard. 1902. |
|---|---|---|---|---|---|---|
| January | 12.159 | 11.053 | 12.361 | 11.322 | 53.52 | 48.43 |
| February | 12.778 | 12.173 | 12.901 | 12.378 | 57.34 | 55.16 |
| March | 14.416 | 11.882 | 14.572 | 12.188 | 63.85 | 53.39 |
| April | 14.454 | 11.618 | 14.642 | 11.986 | 61.72 | 52.79 |
| May | 14.435 | 11.856 | 14.618 | 12.226 | 61.73 | 54.03 |
| June | 13.942 | 12.110 | 14.212 | 12.360 | 57.30 | 53.93 |
| July | ..... | 11.771 | ..... | 11.923 | .... | 52.89 |
| August | ..... | 11.404 | ..... | 11.649 | .... | 51.96 |
| September | ..... | 11.480 | ..... | 11.760 | .... | 52.68 |
| October | ..... | 11.449 | ..... | 11.722 | .... | 52.18 |
| November | ..... | 11.288 | ..... | 11.533 | .... | 51.08 |
| December | ..... | 11.430 | ..... | 11.599 | .... | 50.95 |

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

## Average Prices of Silver, per ounce Troy.

| Month. | 1903. London, Pence. | 1903. N. Y. Cents. | 1902. London, Pence. | 1902. N. Y. Cents. | 1901. London, Pence. | 1901. N. Y. Cents. |
|---|---|---|---|---|---|---|
| January | 21.98 | 45.57 | 25.62 | 55.56 | 28.97 | 62.82 |
| February | 22.11 | 47.89 | 25.41 | 55.09 | 28.13 | 61.06 |
| March | 22.49 | 48.72 | 25.00 | 54.23 | 27.04 | 60.23 |
| April | 23.38 | 50.56 | 24.34 | 52.72 | 27.30 | 59.29 |
| May | 24.89 | 54.11 | 23.71 | 51.31 | 27.43 | 59.64 |
| June | 24.29 | 52.86 | 24.17 | 52.36 | 27.42 | 59.57 |
| July | .... | .... | 24.38 | 52.88 | 26.96 | 58.46 |
| August | .... | .... | 24.23 | 52.52 | 26.94 | 58.37 |
| September | .... | .... | 23.88 | 51.52 | 26.95 | 58.26 |
| October | .... | .... | 23.40 | 50.57 | 26.62 | 57.59 |
| November | .... | .... | 22.70 | 49.07 | 26.12 | 56.64 |
| December | .... | .... | 22.21 | 48.03 | 25.46 | 55.10 |
| Year | .... | .... | 24.09 | 52.16 | 27.11 | 58.95 |

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

## DIVIDENDS.

| Name of Company | Date. | Per Share. | Total. | Total, to Date. |
|---|---|---|---|---|
| Amalgamated Copper | Aug. 31 | 0.50 | 769,440 | 21,964,980 |
| Camp Bird, Ohio | July 28 | .36 | 295,200 | 750,300 |
| †Phila. Nat. Gas, com. | Aug. 1 | .75 | 231,406 | 3,185,425 |
| †Pittsburg Coal, pf. | July 25 | 1.75 | 519,771 | 7,796,565 |
| Quincy | Aug. 15 | 3.00 | 300,000 | 14,120,000 |
| Tenn. Copper | July 30 | 1.25 | 218,750 | 218,750 |
| †U. S. Steel com. | Sept. 9 | 1.00 | 5,083,025 | 50,809,577 |
| †U. S. Steel, pf. | Aug. 15 | 1.75 | 8,929,919 | 89,262,829 |

* Monthly. † Quarterly.

## ASSESSMENTS.

| Name of Company. | Location. No. | Delinq. | Sale. | Amt. |
|---|---|---|---|---|
| Annandale | Utah .. | July 15 | Aug. 8 | .00½ |
| Best & Belcher | Nev. .. | July 17 | Aug. 7 | .15 |
| Chicago & Bingham | Utah .. | July 17 | Aug. 6 | .00¼ |
| Christmas | Utah .. | July 14 | Aug. 8 | .00½ |
| Con. New York | Nev. 18 | July 15 | Aug. 5 | .10 |
| Con. New York | Nev. 18 | July 15 | Aug. 5 | .10 |
| Exchequer | Nev. 42 | Aug. 15 | Sept. 3 | .03 |
| Eutonia | Utah .. | July 13 | Aug. 3 | .00½ |
| Lucky Bill | Utah .. | July 25 | ..... .. | .07½ |
| Marina Marsicano | Cal. .. | Aug. 1 | ..... .. | .10 |
| Martha Washington | Utah .. | July 28 | Aug. 8 | .01½ |
| Mohave | Utah .. | July 28 | Aug. 8 | .01½ |
| New Pass | Nov. .. | July 25 | ..... .. | .04 |
| New State | Utah 5 | July 20 | Aug. 20 | .02½ |
| Seg. Belcher & Midas | Nev. 32 | July 29 | Aug. 18 | .05 |
| Skylark Copper | Utah .. | July 24 | Aug. 10 | .00½ |
| Spider | Utah .. | Aug. 12 | Sept. 1 | .00¼ |
| Tetro | Utah 26 | July 25 | Aug. 22 | .02 |
| Utah Con. | Nev. .. | July 17 | Aug. 7 | .10 |

# STOCK QUOTATIONS

## NEW YORK.

| Company and Location. | Par val | Shares Listed. | July 15. H. | July 15. L. | July 16. H. | July 16. L. | July 17. H. | July 17. L. | July 18. H. | July 18. L. | July 20. H. | July 20. L. | July 21. H. | July 21. L. | Sales. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amalgamated c.,Mont | 100 | 1,538,879 | 49¼ | 48¼ | 50⅝ | 49½ | 49¼ | 48⅛ | 49⅛ | 47¼ | 47¼ | 44⅜ | 46⅛ | 44⅜ | 326,445 |
| †Anaconda c., Mont. | 15 | 1,200,000 | 80¼ | 76½ | ..... | ..... | 84 | 80 | 83 | ..... | ..... | ..... | 79½ | 77⅛ | 6,630 |
| Anaconda Gold, Colo. | 5 | 1,000,000 | .81 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 500 |
| Andes, Nev. | | | ..... | ..... | ..... | ..... | .10 | ..... | ..... | ..... | .08 | ..... | ..... | ..... | 800 |
| Belcher, Nev. | | | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Best & Belcher, Nev. | 3 | 100,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .80 | ..... | ..... | ..... | 100 |
| Con.Cal.&Va.,g.s.,Nev | 2½ | 216,000 | 1.35 | ..... | 1.85 | 1.30 | ..... | ..... | ..... | ..... | 1.30 | ..... | 1.30 | 1.25 | 1,000 |
| Cons. Imperial, Colo. | 1 | 500,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .06 | ..... | ..... | ..... | 1,000 |
| Crown Point, Nev. | 3 | | ..... | ..... | .03½ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 500 |
| Cripple Creek, c., Colo | 1 | 2,000,000 | ..... | ..... | ..... | ..... | .25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 300 |
| Daly, Utah | 3 | | ..... | ..... | ..... | ..... | 2.00 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 50 |
| El Paso, Colo. | 1 | 900,000 | ..... | ..... | .48 | ..... | ..... | ..... | ..... | ..... | .46 | ..... | ..... | ..... | 1,100 |
| Elkton, g., Colo. | 1 | 1,250,000 | ..... | ..... | .60 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 500 |
| Golden Fleece, Colo. | 1 | 600,000 | ..... | ..... | ..... | ..... | .08 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1,000 |
| Greene Con., c., Mex. | 10 | 720,000 | 20¼ | 19⅜ | 20¾ | 20 | 20¼ | 19¼ | 20¼ | 20½ | 21½ | 20 | 20½ | 19⅞ | 12,420 |
| Gould & Curry, Nev. | 1 | | ..... | ..... | .40 | .39 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 200 |
| Horn Silver, Utah. | 52 | 400,000 | 1.15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1.15 | ..... | 1.80 | ..... | 250 |
| Iron Silver, Colo. | 20 | | ..... | ..... | ..... | ..... | 1.85 | ..... | ..... | ..... | 1.80 | ..... | ..... | ..... | 350 |
| Isabella, g., Colo. | 1 | 2,500,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .10 | ..... | ..... | ..... | 500 |
| Jack Pot, Colo. | 1 | | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Justice, Nev. | 1 | 105,000 | .15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .14 | ..... | 800 |
| Little Chief, Colo. | 1 | | .07½ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1,000 |
| Mexican, Nev. | 3 | 100,800 | ..... | ..... | 1.00 | ..... | 1.00 | ..... | ..... | ..... | ..... | ..... | 1.800 | ..... | 800 |
| Mollie Gibson, Colo. | 5 | 1,000,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Moon-Anchor, Colo. | 5 | 600,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .08½ | ..... | 500 |
| Occidental, Nev. | 1 | 100,000 | ..... | ..... | .30 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 30 | ..... | 500 |
| Ontario, Utah. | 100 | | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Ophir, Nev. | 1 | 100,800 | 1.50 | ..... | ..... | ..... | 1.55 | ..... | ..... | ..... | ..... | ..... | ..... | r. | 300 |
| Overman, Nev. | 1 | 115,200 | .35 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .25 | ..... | 600 |
| Pharmacist, Colo. | 1 | 1,500,000 | ..... | ..... | ..... | ..... | .03 | ..... | ..... | ..... | ..... | ..... | .03 | ..... | 1,555 |
| Phœnix, Ariz. | 1 | | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Portland, Colo. | 10 | 3,000,000 | 1.35 | ..... | ..... | ..... | 1.33 | 1.32 | ..... | ..... | ..... | ..... | ..... | ..... | 400 |
| Potosi, Nev. | 3 | 112,000 | .27 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 300 |
| Savage, Nev. | 2½ | 112,000 | ..... | ..... | .18 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 500 |
| Sierra Nevada, Nev. | 3 | 100,000 | .61 | .60 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1.50 | ..... | 1,000 |
| Silverhill, Nev. | 1 | 180,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Small Hopes, Colo. | 20 | 250,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Tenn., c., Tenn. | 25 | 175,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 28½ | ..... | 200 |
| Union Con., Nev. | 2½ | 109,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Union Cop., N. C. | 10 | 300,000 | 1¼ | 1⅛ | 1¼ | 1⅛ | 1⅛ | 1 | 1⅛ | ..... | 1¼ | 1⅛ | 1¼ | ..... | 5,800 |
| Uni'd Cop. com.,Mont | 100 | 450,000 | 18 | 17⅝ | 18⅛ | 17¾ | 18⅜ | 18⅛ | ..... | ..... | 18⅜ | 18¼ | 18⅝ | 18 | 1,000 |
| Utah, Nev. | 1 | | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .34 | ..... | 100 |
| Vindicator, Colo. | 1 | 1,500,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .r. | ..... | ..... |
| White Knob, g. s., Ind. | 100 | 150,000 | 12 | 11 | 11½ | ..... | ..... | ..... | ..... | ..... | 11⅜ | 11 | ..... | ..... | 390 |
| Yellow Jacket, Nev. | 3 | 120,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

Total sales 379,335 shares.

## BOSTON, MASS.*

| Name of Company. | Par val | Shares listed | July 15 H. | July 15 L. | July 16 H. | July 16 L. | July 17 H. | July 17 L. | July 18 H. | July 18 L. | July 20 H. | July 20 L. | July 21 H. | July 21 L. | Sales. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adventure Con., c. | $25 | 100,000 | 4¼ | 4 | 4 | 3⅞ | 3⅞ | 3¾ | 3¾ | ..... | 6 | 5¼ | 5⅝ | 5 | 1,485 |
| Allouez | 25 | 99,511 | 5½ | 5 | 5 | 4⅝ | 5 | 4¾ | 5 | 3¾ | 4⅝ | 4⅜ | 5½ | 4½ | 1,220 |
| Amalgamated, c. | 100 | 1,538,879 | 49⅝ | 48¼ | 50¼ | 46¾ | 49¼ | 46¾ | 49¾ | 47½ | 47⅜ | 44⅜ | 46¾ | 44¾ | 47,612 |
| Am. Gold Dredging | 5 | 90,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Am. Z. L. & Sm. | 25 | 60,000 | 9 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 8 | ..... | ..... | ..... | 250 |
| Anaconda | 25 | 1,200,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 20½ | ..... | 10 |
| Arcadian, c. | 25 | 150,000 | 2 | ..... | 2 | ..... | 2 | ..... | 2 | ..... | 2 | ..... | 2 | ..... | 285 |
| Arnold | 25 | 60,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Atlantic, c. | 25 | 100,000 | 9 | ..... | ..... | ..... | 8 | ..... | ..... | ..... | 8¼ | 8 | ..... | ..... | 540 |
| Bingham Con., g. s. | 50 | 150,000 | 24 | 23⅝ | 24 | 23⅝ | 24½ | 24 | 24 | ..... | 24½ | 23½ | 23½ | 24 | 1,905 |
| Bonanza | 10 | 300,000 | 55 | 50 | ..... | ..... | ..... | ..... | ..... | ..... | .50 | ..... | ..... | ..... | 500 |
| Cal. & Hela, c. | 25 | 100,000 | 431 | 425 | 430 | 429 | 430 | 426 | ..... | ..... | 425 | ..... | 425 | ..... | 86 |
| Centennial, c. | 25 | 90,000 | 16½ | 15¾ | 17⅜ | 16¼ | 16½ | 16¼ | 16½ | ..... | ..... | ..... | 15¾ | 15 | 4,361 |
| Central Oil | 25 | 60,000 | 7 | ..... | 9 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 75 |
| Con. Mercur, g. | 5 | 1,000,000 | ..... | ..... | 1½ | ..... | 1½ | ..... | 1½ | ..... | 1½ | ..... | 1½ | ..... | 5,210 |
| Copper Range Con. | 100 | 285,000 | 48 | 47⅛ | 49¼ | 47 | 49¼ | 46¾ | 49 | 48¼ | 47¼ | 46 | 47¼ | 46 | 10,524 |
| †Daly-West, | 20 | 180,000 | †40 | ..... | 40 | ..... | 40½ | ..... | ..... | ..... | 40 | ..... | 41½ | 41 | 472 |
| Dominion Coal | 100 | 150,000 | 97½ | 97 | 98 | 96 | 98 | 97 | 98 | ..... | 100 | 96½ | 95⅜ | ..... | 1,454 |
| Dominion Coal, pf. | 100 | 30,000 | 112 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 18 |
| Dominion I. & S. | 100 | 100,000 | ..... | ..... | 15 | ..... | 15 | ..... | 15½ | 15 | 15 | 14 | 14½ | 14 | 1,755 |
| Elm River | 12 | 100,000 | ..... | ..... | 2¾ | 2½ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 285 |
| Franklin, c. | 25 | 100,000 | 8¼ | 8 | 8⅜ | 8 | ..... | ..... | ..... | ..... | 8 | 7½ | 8 | ..... | 1,110 |
| Granby Con. | 10 | 1,336,303 | 4 | ..... | ..... | ..... | ..... | ..... | 4½ | ..... | 4⅛ | ..... | 4 | ..... | 550 |
| Guanajuato Con. | 5 | 385,000 | 1 | ..... | ..... | ..... | 1¼ | 1⅛ | 1 | ..... | 1⅛ | 1 | 1 | ..... | 2,030 |
| Isle Royal Con., c. | 25 | 385,000 | 6 | 5¼ | ..... | ..... | 7 | 6¾ | 7¾ | ..... | 8 | 7¼ | ..... | ..... | 760 |
| Mass Con., C. | 25 | 100,000 | 5⅞ | 5 | 5¾ | ..... | 5½ | 4¾ | 5½ | ..... | ..... | ..... | ..... | ..... | 785 |
| Mayflower, c. | 25 | 100,000 | ..... | ..... | 1½ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 25 |
| †Michigan, c. | 25 | 100,000 | 7½ | 7¼ | ..... | ..... | ..... | 6½ | 6¾ | 6½ | ..... | ..... | ..... | ..... | 755 |
| Mohawk, c | 25 | 100,000 | 38 | 38 | 38 | 36¼ | 7¼ | 36½ | 37⅝ | 37 | 37½ | 36½ | 37 | 37¾ | 2,725 |
| Mont. Coal & Coke | 25 | 200,000 | ..... | ..... | ..... | ..... | 37½ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Mont'l & Boston, c. | 5 | 570,000 | 80 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 50 |
| New Idria | 5 | 100,000 | ..... | ..... | 9 | 8½ | ..... | 8 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Nova Scotia St. & C. | 100 | 37,623 | ..... | ..... | ..... | ..... | 8½ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Nova Scotia St.&C., pf. | 100 | 16,300 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 8½ | ..... | 900 |
| Old Colony, c. | 25 | 100,000 | 75 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 150 |
| Old Dominion, c. | 25 | 150,000 | 11½ | 10⅝ | 11 | 10½ | ..... | 10¾ | 11 | ..... | 11 | 10¾ | 11 | 10½ | 1,600 |
| Osceola, c. | 25 | 98,150 | 51 | 50¼ | 51½ | 51 | 11¼ | 48½ | 51½ | 51 | 51 | 48½ | 50 | 49 | 3,330 |
| Parrott, s. c. | 10 | 229,850 | 19 | 18½ | 19¼ | 18½ | 51 | 17¾ | 19 | 18½ | 18¾ | 18⅜ | 18 | ..... | 2,152 |
| Phœnix Con, c. | 25 | 100,000 | 4½ | 4¼ | ..... | ..... | 19 | ..... | ..... | ..... | 4 | ..... | 4 | ..... | 510 |
| Quincy, c. | 25 | 100,000 | 97 | 95 | 97 | 96 | 4 | ..... | 97 | ..... | 97 | ..... | 100 | ..... | 141 |
| Rhode Island, c. | 25 | 100,000 | 1½ | ..... | 2 | 2 | 97 | ..... | ..... | ..... | 1½ | ..... | 1½ | ..... | 385 |
| Santa Fe, g. c. | 10 | 250,000 | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 20 |
| Shannon, c. | 10 | 188,153 | 10 | 9 | 9½ | 9 | ..... | 9½ | ..... | ..... | 9½ | ..... | 10 | 9¼ | 1,025 |
| Tamarack, c. | 25 | 60,000 | 90 | 85 | 91 | 85 | 10 | 85 | ..... | ..... | 85 | ..... | 84½ | ..... | 519 |
| Tecumseh | 25 | 80,000 | ..... | ..... | 40 | ..... | 90 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 59 |
| Tennessee | 25 | 160,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Trimountain | 100 | 450,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 84 | ..... | ..... | ..... | 150 |
| Trinity, c. | 25 | 419,000 | 5 | 4¾ | 5¼ | 4¾ | 84 | 4¾ | 5 | ..... | 5 | 4¾ | ..... | ..... | 1,950 |
| United c. | 25 | 240,000 | ..... | ..... | ..... | ..... | 5 | ..... | 20⅜ | 19⅝ | ..... | ..... | ..... | ..... | ..... |
| United States, g. | 10 | 300,000 | 19¼ | 18½ | 20 | 19 | 20¼ | 19 | 11 | 10½ | 19⅜ | 19⅜ | 19⅜ | 19 | 7,455 |
| U. S. Coal & Oil | 25 | 100,000 | 11¼ | 10⅝ | 11¼ | 10¾ | 11 | 10¾ | 26¼ | ..... | 11 | 10¾ | 10¾ | 10¼ | 4,217 |
| Utah Con., g. | 25 | 100,000 | 26 | 25⅜ | 26½ | 25⅝ | 26¾ | 26 | ..... | ..... | 26½ | 25 | 25¾ | 24½ | 5,189 |
| †Victoria | 25 | 60,000 | 3¾ | 3½ | 3½ | ..... | 3¾ | 3½ | ..... | ..... | 3½ | ..... | 3½ | ..... | 1075 |
| Winona, c. | 25 | 100,000 | 7 | ..... | 7½ | 7¼ | 7¾ | 7½ | ..... | ..... | 7¼ | 7⅛ | 7¼ | 7⅛ | 1,125 |
| Wolverine, c. | 25 | 60,000 | ..... | ..... | 64 | ..... | 64 | 63½ | ..... | ..... | 63½ | ..... | 63¾ | 63 | 218 |
| Wyandot | 25 | 100,000 | ..... | ..... | 1¼ | ..... | ..... | ..... | ..... | ..... | 1¼ | ..... | 1½ | ..... | 410 |

*Boston Stock Exchange. †Ex Dividend. ‡Assessment Paid. §Holiday. Total sales, 117,208 shares.

## SAN FRANCISCO.*

| Name of Company. | Location. | Capitalization. | July 10. H. | July 10. L. | July 11. H. | July 11. L. | July 13. H. | July 13. L. | July 14. H. | July 14. L. | July 15. H. | July 15. L. | July 16. H. | July 16. L. | Sales |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Central Eureka | Cal. | $400,000 | .86 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1,000 |
| Colehan | Nev. | 1,000,000 | ..... | ..... | ..... | ..... | .21 | .19 | .20 | ..... | ..... | ..... | .20 | .18 | 2,400 |
| Draper Gold Mfg. Co. | Cal. | 500,000 | ..... | ..... | ..... | ..... | .09 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1,100 |
| Esperanza | Nev. | 1,000,000 | .06 | ..... | .05 | ..... | .07 | .06 | .06 | ..... | .07 | .06 | .07 | .06 | 16,600 |
| Gipsy Queen | Nev. | 750,000 | .26 | ..... | .28 | ..... | ..... | ..... | .17 | ..... | ..... | ..... | .27 | ..... | 1,000 |
| Gold Mtn. Con. | Nev. | 750,000 | ..... | ..... | ..... | ..... | .10 | .07 | .10 | .05 | .10 | ..... | ..... | ..... | 2,170 |
| Lucky Tom | Nev. | 1,000,000 | .14 | ..... | ..... | ..... | .12 | .10 | ..... | ..... | ..... | ..... | ..... | ..... | 2,100 |
| MacNamara | Nev. | 500,000 | ..... | ..... | .30 | ..... | ..... | ..... | ..... | ..... | .26 | ..... | .27 | ..... | 1,350 |
| Mont-Tonopah | Nev. | 1,000,000 | .91 | .90 | .87 | .86 | .89 | .85 | .88 | ..... | .91 | .85 | .88 | .88 | 4,750 |
| New York Tonopah | Nev. | 1,000,000 | .14 | ..... | .11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 700 |
| Paymaster | Nev. | 750,000 | .20 | ..... | ..... | ..... | .19 | ..... | .20 | ..... | .17 | .17 | ..... | ..... | 1,800 |
| Rescue | Nev. | 500,000 | .15 | ..... | .15 | ..... | .15 | .14 | .15 | ..... | .14 | ..... | ..... | ..... | 4,050 |
| Tonopah-Belmont | Nev. | 2,000,000 | 2.15 | ..... | ..... | ..... | ..... | ..... | 2.10 | ..... | ..... | ..... | 2.05 | ..... | 1,400 |
| Tonopah & Cal. | Nev. | 2,000,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Tonopah Fraction | Nev. | 750,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Tonopah Midway | Nev. | 1,000,000 | .50 | .49 | .51 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2,200 |
| Tonopah Mg. Co. | Nev. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 8.00 | ..... | ..... | ..... | ..... | ..... | 50 |
| Tonopah North Star | Nev. | 750,000 | .46 | ..... | .47 | ..... | .55 | .51 | .60 | .56 | .60 | .55 | .55 | .54 | 6,900 |
| Tonopah Union | Nev. | 750,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| United Tonopah | Nev. | 1,000,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .16 | ..... | ..... | ..... | 2,000 |

*San Francisco & Tonopah Mining Exchange. Total sales 51,670 shares.

## COAL, IRON AND INDUSTRIAL STOCKS.*

| Name of Company. | Par val. | Shares Issued. | July 15. H. | July 15. L. | July 16. H. | July 16. L. | July 17. H. | July 17. L. | July 18. H. | July 18. L. | July 20. H. | July 20. L. | July 21. H. | July 21. L. | Sales |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Allis-Chalmers, U. S. | $100 | ..... | 12⅜ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 100 |
| Allis-Cham's, pf, U. S. | 100 | 200,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 82 | 81½ | 70 |
| Am. Agr. Chem., U. S. | 100 | | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Am.Agr.Chem.pf,U.S. | 100 | 181,350 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Am. Sm. & Ref., U. S. | 100 | 500,000 | 43⅜ | 42 | 43 | 41 | 43¼ | 41 | 42¾ | 42¼ | 42⅝ | 41½ | 42½ | 41⅜ | 28,240 |
| Am.Sm. & Ref.,pf,U.S. | 100 | 500,000 | 91¾ | 90 | 91 | ..... | 92¼ | 90¾ | ..... | ..... | ..... | ..... | 91⅛ | 89½ | 3,836 |
| Am. Steel & Fdy.,U.S. | 100 | | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 11 | 11 | 100 |
| Am. S. & Fdy., U. S. | 100 | 155,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Col. Fuel & I., Colo. | 100 | 239,320 | 60¼ | 59 | 60 | 58 | 58½ | 52 | 54 | 53¾ | 52 | 50 | 80½ | 49 | 21,000 |
| Col. & H. C. & I., Colo. | 100 | 69,244 | 16½ | 15 | 16¼ | 15¾ | 16¾ | 15½ | ..... | ..... | 16¼ | 15¼ | 15½ | 15 | 3,310 |
| †Crucible Steel, U. S. | 100 | 250,000 | 13½ | 10½ | 12¼ | 11 | 12⅞ | 12¾ | 12½ | 12¼ | 12½ | 11¾ | 11 | 11 | 11,410 |
| †CrucibleSteel,pf,U.S. | 100 | 250,000 | 77¾ | 76 | 76¾ | 76 | 77½ | 77 | 78 | 77¾ | 77⅞ | 75⅝ | 78 | 74⅜ | 7,828 |
| †Mong. R. Coal, Pa. | 50 | 200,000 | 10⅝ | 10½ | 10⅝ | 10¼ | 10⅜ | ..... | 10⅝ | ..... | ..... | ..... | 10¼ | ..... | 2,505 |
| †Mong. R. Coal, pf, Pa. | 50 | 98,300 | 38⅝ | 38⅜ | 38¾ | 38⅜ | 38½ | ..... | 38½ | 38⅜ | 39 | 38 | 39 | 38¾ | 1,029 |
| National Lead, U. S. | 100 | 149,054 | 15½ | 15⅛ | 16 | ..... | 16½ | ..... | 16 | ..... | 15¾ | ..... | 15¼ | ..... | 1,560 |
| National Lead, pf,U.S. | 100 | 149,040 | ..... | ..... | ..... | ..... | 85 | ..... | ..... | ..... | 84 | ..... | ..... | ..... | 350 |
| †Phila. Nat. Gas. | 100 | 308,542 | 46 | 39¾ | ..... | ..... | 40⅝ | 40½ | 40¾ | ..... | 40½ | ..... | 40 | 39⅞ | 995 |
| †Phila. Nat. Gas, pf. | 100 | 212,873 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| †Pittsburg Coal, Pa. | 100 | 300,307 | 26½ | 24½ | 24½ | 20 | 28 | 25½ | 28 | 27⅜ | 27½ | 26½ | 26½ | 25¾ | 10,184 |
| †Pittsburg Coal,pf,Pa. | 100 | 297,012 | 84⅜ | 82¾ | ..... | ..... | 85¼ | 85 | 86 | 85 | ..... | ..... | 85 | 84 | 1,243 |
| Republic I. & S., U. S. | 100 | 273,520 | 13½ | 12⅜ | 13⅜ | 12¾ | 13⅜ | 13 | 13⅜ | 13 | 13 | 11½ | 12¾ | 12¾ | 6,710 |
| Republic I.&S.,pf,U.S. | 100 | 203,569 | 71⅞ | 70¼ | 71½ | 70⅜ | 72 | 71 | 72 | ..... | 71¼ | 70 | 70 | 67 | 8,165 |
| Sloss-Shef S. & I., Ala. | 100 | 75,000 | 38¾ | 38⅜ | 39⅜ | 38½ | 39¼ | 39 | 39¼ | 38 | 39 | 38¾ | 39 | 38 | 3,460 |
| Sloss-Shef S.&I.pf,Ala. | 100 | 65,085 | ..... | ..... | 82 | 82 | 83 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 100 |
| Standard Oil, U. S. | 100 | 970,000 | 644 | 635 | 642 | 640 | 641½ | 641 | ..... | ..... | ..... | ..... | 641½ | 640 | 639 | 635 | 243 |
| Tenn. C.I. & R.R. | 100 | 225,000 | 47½ | 45 | 48 | 46¾ | 48¼ | 46½ | 47¼ | 47 | 48 | 44¾ | 45¾ | 41½ | 39,440 |
| U.S. Red. & Ref., U. S. | 100 | 59,188 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| U.S.Red&Ref.,pf, U.S. | 100 | 39,485 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| U.S. Steel Corp., U. S. | 100 | 5,084,952 | 27⅝ | 25¼ | 26¾ | 25⅝ | 26¾ | 26 | 26¾ | 26¼ | 26¾ | 26 | 125 | 25 | 22 | 387,248 |
| U.S. SteelCrop.pf,U.S. | 100 | 5,103,141 | 78½ | 75½ | 77⅛ | 75⅝ | 77⅜ | 76¾ | 77⅜ | 77 | 77⅛ | 75¾ | 174 | 70 | 130,168 |
| Va.-Car Chem., U. S. | 100 | 279,844 | 47 | 45 | 46¾ | 45⅝ | 46¾ | 45¾ | 47¼ | 46¾ | 46 | 42 | 41½ | 39 | 14,215 |
| Va.-Car Chem.,pf,U.S. | 100 | 120,000 | 113 | 111½ | ..... | ..... | 113 | ..... | 113½ | 113 | ..... | ..... | ..... | ..... | 780 |
| Va. I. C. & Coke, U. S. | 100 | 86,416 | 26¼ | 26 | 26½ | ..... | 26 | ..... | ..... | ..... | ..... | ..... | 24 | ..... | 700 |

*New York Stock Exchange. †Pittsbnrg Stock Exchange. ‡Ex-dividend. Total sales 688,026 shares.

## COLORADO SPRINGS, COLO.*

| Name of Company. | Par Val | Shares Listed. | July 21 H. | July 21 L. | July 13 H. | July 13 L. | July 14 H. | July 14 L. | July 15 H. | July 15 L. | July 16 H. | July 16 L. | July 17. H. | July 17. L. | Sales |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acacia | $1 | 1,500,000 | .07½ | .07 | .07½ | .07 | .07½ | .07 | .07½ | .07 | .07½ | .07 | .07½ | .07 | ..... |
| Am. Con. | 1 | 2,000,000 | .03 | ..... | .02¼ | ..... | .02 | ..... | .02 | ..... | .03 | .01½ | .02½ | ..... | ..... |
| Anaconda | 5 | 1,000,000 | .12½ | .11 | .12½ | .11¾ | .11 | ..... | .13 | .11½ | .13 | .11 | .11¾ | .06½ | 4,000 |
| Ben Hur | 1 | 900,000 | .01¾ | ..... | .01¾ | ..... | .01¾ | ..... | .01¾ | ..... | .01¾ | ..... | .01¾ | ..... | ..... |
| Blue Bell | 1 | 1,000,000 | .05¾ | .05 | .05 | ..... | .05¾ | .05 | .05 | ..... | .05 | ..... | .05 | ..... | ..... |
| C. C. & M. | 1 | 1,000,000 | .02½ | ..... | .02½ | ..... | .02¼ | ..... | .02¼ | ..... | .02¼ | ..... | .02½ | ..... | 1,000 |
| C. K. & N. | 1 | 1,250,000 | .20½ | ..... | .21 | .20 | .20½ | .20 | .21 | .20 | .20½ | .20¼ | .21 | .20½ | 17,000 |
| C. C. Con. | 1 | 2,000,000 | .04¾ | .04 | .05 | .04 | .04 | ..... | .04 | ..... | .05 | .04 | .04¾ | .04 | 3,000 |
| Coriolanus | 1 | 1,500,000 | .02½ | ..... | .02½ | ..... | .02½ | ..... | .02½ | ..... | .02½ | ..... | .02½ | ..... | ..... |
| Des Moines | 1 | 750,000 | .03 | .02 | .03½ | .02 | .03½ | .02 | .03½ | .02 | ..... | ..... | ..... | ..... | ..... |
| Dr. Jack Pot | 1 | ..... | .09 | ..... | .09 | ..... | .09 | .08¾ | .09 | ..... | .09 | .08¼ | .09 | .08⅝ | 2,500 |
| Elkton Con. | 1 | 1,250,000 | .41 | ..... | .45 | .41 | .40¼ | .40¼ | .45 | .40½ | .40½ | .40¼ | .41⅞ | .40½ | 31,678 |
| El Paso | 1 | 900,000 | .60 | .59 | .59½ | .59 | .60 | .58 | .60 | .57 | .59 | .57¾ | .59 | ..... | 6,606 |
| Fannie Rawlings | 1 | 1,000,000 | .04 | ..... | .03¾ | ..... | .03¾ | ..... | .03¾ | ..... | .03 | ..... | .03¾ | ..... | 1,000 |
| Findley | 1 | 1,250,000 | .14½ | .13½ | .14¾ | .13 | .14½ | .13½ | .14¼ | .13½ | .15 | .13⅞ | .14¾ | .14 | 2,000 |
| Gold King | 1 | 1,000,000 | .03 | ..... | .02⅝ | .02⅜ | .02⅜ | .23¼ | .02½ | .02⅜ | .02⅞ | .02½ | .02½ | .02⅜ | 1,000 |
| Gold Dollar Con. | 1 | ..... | .04⅞ | .04¾ | .04⅞ | .04¾ | .04⅞ | .04¾ | .04¾ | .04¾ | .04⅞ | .04⅜ | .04⅞ | .04¾ | 12,300 |
| Golden Cycle | 1 | 2,000,000 | .69 | ..... | .72 | .70 | .69 | ..... | .72 | .69 | .72 | .69¾ | .70 | .68 | 1,500 |
| Golden Fleece | 1 | 600,000 | .06 | ..... | .12 | .06 | .08 | ..... | ..... | ..... | .12 | ..... | .12 | ..... | 500 |
| Gould | 1 | 1,250,000 | .03 | .02¾ | .03½ | .02¾ | .03 | .02⅞ | .03 | .02¾ | .03 | .02¾ | .03 | ..... | 1,500 |
| Hart | 1 | 1,000,000 | .05 | .02½ | .05 | .02½ | .05 | ..... | .02½ | ..... | .02½ | ..... | .05 | .02½ | ..... |
| Isabella | 1 | 2,500,000 | .12 | .11¼ | .11½ | .11¼ | .11¾ | .11¼ | .11¾ | .11½ | .11¾ | .11 | .11 | .10½ | 9,800 |
| Jack Pot | 1 | 1,250,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Last Dollar | 1 | 1,500,000 | .47 | ..... | .47 | ..... | .47 | ..... | .50 | ..... | .50 | ..... | .50 | ..... | ..... |
| Lexington | 1 | 1,500,000 | .03¾ | .03½ | .03¾ | .03½ | .04 | .03½ | .04 | .03½ | .03½ | ..... | .04 | .03⅝ | 6,000 |
| Little Chief | 1 | 2,000,000 | .02½ | ..... | .02 | ..... | .03 | .02 | .03 | .02 | .02 | ..... | .03 | .02 | ..... |
| Mollie Gibson | 5 | 1,000,000 | .06 | ..... | .05½ | ..... | .06 | ..... | .05½ | ..... | .05½ | ..... | .05½ | ..... | ..... |
| Moon-Anchor | 1 | 600,000 | .09 | .07½ | .08½ | .07½ | .08¼ | .08 | .08¼ | .08 | .09 | .08 | .08¾ | .08 | ..... |
| New Haven | 1 | 1,500,000 | .03 | .02½ | .03 | .02½ | .02⅝ | .02½ | .02⅝ | .02½ | .03 | .02½ | .03 | .02½ | 1,000 |
| Pharmacist, Con | 1 | 1,500,000 | .03⅝ | .03 | .03⅝ | ..... | .03⅜ | .03⅛ | .03⅛ | ..... | .03½ | .03 | .03⅜ | .03 | 4,443 |
| Pinnacle | 1 | 2,000,000 | .04 | .....

# STOCK QUOTATIONS

## MEXICO*. July 10.

| Name of Company. | Shares Issued. | Last div'd | Prices. Bid. | Prices. Ask. |
|---|---|---|---|---|
| **Durango:** | | | | |
| Ca. Min. de Penoles | 2,500 | $50.00 | $3,800 | $4,100 |
| San Andres de la Sierra | 200 | ..... | 10,000 | ..... |
| **Guanajuato:** | | | | |
| Angustias, Pozos | 2,400 | 5.00 | 00 | 90 |
| Cinco Senores y An., aviadoras | 2,000 | 15.00 | 195 | 200 |
| Cinco Senores y An., aviada | 400 | 10.00 | 175 | 185 |
| Providencia, San Juan de la Luz | 6,000 | 2.00 | 150 | 160 |
| Queensland y Australia | 300 | ..... | 95 | 105 |
| **Guerrero:** | | | | |
| Delfina, 1st serie | 2,500 | ..... | 40 | 45 |
| Delfina, 2nd serie | 2,500 | ..... | 30 | 35 |
| Garduno y Anexas | 7,200 | ..... | 45 | 60 |
| **Hidalgo:** | | | | |
| Amistad y Condordia | 9,600 | 6.90 | 90 | 91 |
| Carmen, aviada | 1,100 | ..... | 140 | 150 |
| Guadalupe Fresnillo Mill | 1,000 | ..... | 200 | 250 |
| Guadalupe Fresnillo Mine | 1,400 | ..... | 70 | 80 |
| La Blanca, aviadora | 1,536 | ..... | ..... | ..... |
| La Blanca, aviada | 768 | ..... | ..... | ..... |
| La Reina y An., aviadora | 5,600 | ..... | 21 | 22 |
| Luz de Maravillas, aviadas | 1,100 | ..... | ..... | 20 |
| Maravillas y An., aviador | 1,680 | ..... | 90 | 110 |
| Maravillas el Lobo | 1,000 | ..... | 130 | 180 |
| Palma y An., aviador | 1,800 | ..... | ..... | 12 |
| Real del Monte | 2,554 | 10.00 | ..... | ..... |
| Refugio, aviada | 12,800 | ..... | 6 | 8 |
| Santa Anay An., aviadora | 1,800 | ..... | 30 | 40 |
| Santa Anay An., aviada | 600 | ..... | 25 | 30 |
| Sta. Gertrudis y An., aviadas | 9,600 | ..... | 8 | 10 |
| Sta. Gertrudis y An., aviadora | 28,800 | 1.00 | 80 | 40 |
| Santo Tomas Apostol aviadoras | 5,100 | ..... | 2 | 3 |
| San Felipe de Jesus, aviadora | 3,600 | ..... | 18 | 20 |
| San Felipe de Jesus, aviada | 1,200 | ..... | ..... | 10 |
| San Rafael y An., Trompillo | 1,200 | 12.00 | 1,360 | 1,400 |
| San Rafael y An., aviada | 1,200 | 4.00 | 510 | 520 |
| Soledad, aviada | 980 | ..... | 460 | 470 |
| Sorpresa, aviada | 960 | 5.00 | 330 | 335 |

| Name of Company. | Shares Issued. | Last div'd | Prices. Bid. | Prices. Ask. |
|---|---|---|---|---|
| **Mexico:** | | | | |
| Alacran | 2,400 | ..... | 60 | 70 |
| Aldebarren | ..... | ..... | 93 | 98 |
| Buen Despacho | 2,000 | ..... | 82 | 84 |
| Dos Estrellas | 3,000 | 30.00 | 3,000 | 3,010 |
| La Esperanza (El Oro.) | 3,000 | 10.00 | 1,500 | 1,500 |
| La Reformia, aviadores | 2,000 | ..... | 95 | 98 |
| Providencia, pagadoras | 1,600 | ..... | ..... | ..... |
| Providencia, liberadas | 900 | ..... | ..... | ..... |
| Santa Ana, Esperanza | 2,400 | ..... | 70 | 90 |
| **Michoacan:** | | | | |
| Luz de Borda, aviadora | 3,000 | ..... | 108 | 110 |
| Luz de Borda, aviado | 1,000 | ..... | 42 | 44 |
| **Nuevo Leon;** | | | | |
| La Fraternal | 1,000 | ..... | 600 | 550 |
| Norias de Bajan | 1,000 | ..... | 700 | 800 |
| Santiago y An., Tlal. | 4,000 | ..... | ..... | ..... |
| **San Luis Potosi:** | | | | |
| Concepcion y An. | 3,000 | ..... | 98 | 105 |
| El Barreno, aviadora | 2,000 | 2.00 | 30 | 35 |
| Sta. Maria de la Paz | 2,400 | 20.00 | 690 | 710 |
| San Diegoy Annexas | 2,400 | 4.00 | 25 | 28 |
| **Zacatecas:** | | | | |
| Asturiana y An. | 2,500 | ..... | 70 | 80 |
| Candelaria y Pinos | 2,500 | 10.00 | 260 | 270 |
| Cubiertas | 2,400 | ..... | ..... | ..... |
| Esperanza y An. | 2,400 | ..... | 50 | 62 |
| Lourdes | 2,500 | ..... | 35 | 40 |
| Luz de Minillas, pagadoras | 2,000 | ..... | 10 | 15 |
| Nueva Quebradilla, aviadoras | 2,400 | ..... | 80 | 95 |
| Nueva Quebradilla, aviadas | 600 | ..... | 50 | 75 |
| San Carlos y Annexas | 2,500 | 20.00 | 130 | 150 |
| Sta. Maria de Gaud. | 2,500 | 10.00 | 75 | 85 |
| **Miscellaneous:** | | | | |
| Bartolome de Medina | 2,000 | 1.50 | 50 | 70 |
| Guadalupe Hacienda | 20,000 | 6.00 | ..... | ..... |
| La Luz Hac. (Pachuca.) | 3,750 | ..... | 280 | 290 |
| La Reina (Chihuahua.) | 192 | ..... | ..... | ..... |
| Naica (Chihuahua.) | 100 | ..... | 11,000 | 13,000 |
| Natividad (Oaxaca) aviadora | 1,800 | 10.00 | 1,000 | 1,100 |
| Natividad (Oaxaca) aviadas | 600 | 4.00 | 1,000 | 1,100 |
| San Francisco Hac. | 6,000 | 1.00 | 52 | 55 |
| Santa Ana Huantla Morelos | 4,000 | ..... | ..... | ..... |
| Union Hacienda | 3,000 | 5.00 | 225 | 240 |

*Values are in Mexican currency.

## LONDON. July 9.

| Name and Country of Company. | Shares Issued. | Par value. £. s. d. | Latest dividend. Amt. s. d. | Latest dividend. Date. | Quotations. Buyers. £ s. d. | Quotations. Sellers. £ s. d. |
|---|---|---|---|---|---|---|
| Alaska-Treadwell, g., Alaska | 200,000 | 5 0 0 | 3 0 | Apr., 1903 | 4 12 6 | 4 17 6 |
| Anaconda, c. s., Montana | 1,200,000 | 5 0 0 | 2 0 | May, 1903 | 4 5 0 | 4 10 0 |
| Arizona, c., Def., ord | 63,444 | 1 0 0 | 5 6 | Feb., 1903 | 7 15 0 | 8 5 0 |
| Arizona, pref., ord | 316,350 | 1 0 0 | 5 6 | Feb., 1903 | 8 0 0 | 8 5 0 |
| Camp Bird, g., Colorado | 738,000 | 1 0 0 | 1 6 | July 1903 | 1 8 9 | 1 11 3 |
| Central Chile, C., Chile | 276,248 | 1 0 0 | ..... | ..... | 3 0 | 4 0 |
| Copiapo, c., Chile | 112,500 | 2 0 0 | 6 10 | May, 1903 | 1 15 0 | 2 0 0 |
| De Lamar, g. s., Idaho | 80,000 | 1 0 0 | 2 0 | Nov., 1902 | 10 0 | 12 6 |
| El Oro, g., Mexico | 1,000,000 | 1 0 0 | 1 6 | Dec., 1902 | 1 13 9 | 1 16 3 |
| Frontino & Bolivia, g., Columbia | 128,662 | 1 0 0 | 3 0 | July, 1901 | 15 0 | 17 6 |
| Le Roi, g., British Col. | 200,000 | 5 0 0 | 5 0 | Nov., 1899 | 1 2 6 | 1 5 0 |
| Le Roi No. 2, g., British Col. | 120,000 | 5 0 0 | 5 0 | May, 1902 | 1 5 0 | 1 7 6 |
| Mesquital, Mexico | 250,000 | 2 0 | 3 | Feb., 1903 | 2 6 | 3 6 |
| Montana, g. s., Montana | 657,128 | 1 0 0 | 6 | April 1899 | 1 9 | 2 3 |
| Mountain, c., Cal. | 250,000 | 5 0 0 | 4 0 | Nov., 1902 | 3 2 6 | 3 7 6 |
| Stratton's Independence, Colorado | 1,000,007 | 1 0 0 | 6 | Apr., 1902 | 8 6 | 9 6 |
| *St. John del Rey., g., Brazil | 546,265 | 1 0 0 | 8 | June, 1903 | 15 0 | 16 3 |
| Utah Con., g . c. (Highland Boy), Utah | 300,000 | 1 0 0 | 7 0 | Jan., 1903 | 5 10 0 | 6 0 6 |
| Ymir, g., British Col. | 200,000 | 1 0 0 | 1 0 | Mar., 1902 | 6 3 | 8 9 |
| European: | | | | | | |
| Linares, l., Spain | 15,000 | 3 0 0 | 9 | Oct., 1902 | 2 0 0 | 2 10 0 |
| Mason & Barry, c., sul., Port'g'l | 185,172 | 1 0 0 | 11 0 | May, 1903 | 3 7 6 | 3 12 6 |
| Rio Tinto, c., Spain | 325,000 | 5 0 0 | 27 6 | Apr., 1903 | 46 12 6 | 46 17 6 |
| Rio Tinto, pref., Spain | 325,000 | 5 0 0 | 2 6 | Apr., 1903 | 6 0 0 | 6 5 0 |
| Tharsis, c., Spain | 625,000 | 2 0 0 | 6 0 | May, 1903 | 3 17 6 | 4 2 6 |
| Australia and New Zealand: | | | | | | |
| Assoc. Gold Mines, W. Australia | 495,388 | 1 0 0 | 2 0 | July, 1903 | 1 18 9 | 2 1 3 |
| Briseis, tin, Tasmania | 600,000 | 1 0 0 | ..... | ..... | 4 6 | 5 0 |
| Broken Hill Pr'p, s., N. S. Wales | 960,000 | 8 0 | 1 0 | Feb., 1903 | 1 7 6 | 1 8 6 |
| *Cosmopolitan Prop., W. Australia | 385,000 | 1 0 0 | 6 | July, 1902 | 16 6 | 17 0 |
| Golden Horse Shoe, W. Australia | 300,000 | 5 0 0 | 6 0 | Apr., 1903 | 8 13 9 | 8 16 3 |
| Great Fingall Con., W. Australia | 250,000 | 1 0 0 | 5 0 | Sept., 1902 | 7 13 9 | 7 16 3 |
| Great Bo'd'r Pr'p, W. Australia | 1,750,000 | 2 0 | 6 | June, 1903 | 1 6 0 | 1 6 6 |
| Ivanhoe Gold Corp., W. Australia | 200,000 | 5 0 0 | 4 0 | Jan., 1903 | 8 13 9 | 8 16 3 |
| Kalgurli, g., W. Australia | 120,000 | 1 0 0 | 2 6 | July, 1903 | 4 8 9 | 4 11 3 |
| Lake View Cons., g., W. Australia | 250,000 | 1 0 0 | rts. | Aug., 1902 | 2 7 6 | 2 10 0 |
| Mt. Lyell M. & R. L, c., Tasmania | 275,000 | 3 0 0 | 1 0 | July, 1903 | 3 0 0 | 3 2 6 |
| *Mt. Morgan, g., Queensland | 1,000,000 | 1 0 0 | 3 | May, 1903 | 3 1 3 | 3 3 9 |
| Waihi, g., New Zealand | 497,412 | 1 0 0 | 2 6 | June, 1903 | 5 3 9 | 5 6 3 |
| Indian: | | | | | | |
| Champion Reef, g., Colar Fields | 473,000 | 10 0 | 4 6 | May, 1903 | 7 6 3 | 7 8 9 |
| Mysore Gold, Colar Fields | 566,043 | 10 0 | 4 0 | July, 1903 | 7 2 6 | 7 5 0 |
| Nundydroog, g., Colar Fields | 484,000 | 10 0 | 1 6 | Mar., 1903 | 2 10 0 | 2 12 6 |
| Ooregum, g., Colar Fields | 343,000 | 10 0 | 1 6 | Apr., 1903 | 1 10 0 | 1 12 6 |
| Ooregum, g., pref., g., Colar Fields | 240,000 | 10 0 | 1 6 | Apr., 1903 | 1 18 9 | 2 1 3 |
| African: | | | | | | |
| Angelo, g., Transvaal | 600,000 | 1 0 0 | 6 0 | July, 1903 | 7 0 0 | 7 5 0 |
| Bonanza, g., Transvaal | 200,000 | 1 0 0 | 10 0 | June, 1903 | 4 2 6 | 4 5 0 |
| British South Africa | 4,436,019 | 1 0 0 | rts. | May, 1889 | 2 13 9 | 2 16 3 |
| Cape Copper, S. Africa | 300,000 | 2 0 0 | 1 0 | June, 1903 | 2 10 0 | 2 12 6 |
| Cape Copper, pref., S. Africa | 75,000 | 2 0 0 | 1 0 | June, 1903 | 2 10 0 | 2 15 0 |
| City and Sub'n (New), g., Transvaal | 340,000 | 4 0 0 | 4 0 | Aug., 1903 | 6 7 6 | 6 12 6 |
| Crown Reef, g., Transvaal | 120,000 | 1 0 0 | 4 0 | June, 1903 | 16 15 0 | 17 5 0 |
| De Beers Con., d., pref., Cape Colony | 800,000 | 2 10 0 | 10 0 | July, 1903 | 19 6 3 | 19 8 9 |
| De Beers Con., def | 1,000,000 | 2 10 0 | 15 6 | Mar., 1903 | 19 17 6 | 20 2 6 |
| East Rand, Prop., Transvaal | 970,000 | 1 0 0 | 5 0 | June, 1903 | 7 5 0 | 7 7 6 |
| Ferreira, g., Transvaal | 90,000 | 1 0 0 | 15 0 | June, 1903 | 20 15 0 | 21 5 0 |
| Geldenhuis Est., g., Transvaal | 200,000 | 1 0 0 | 6 0 | June, 1903 | 6 7 6 | 6 10 0 |
| Geduld, g., Transvaal | 400,000 | 1 0 0 | rts. | Mar., 1902 | 6 13 9 | 6 16 3 |
| Henry Nourse, g., Transvaal | 125,000 | 1 0 0 | 10 0 | Feb., 1903 | 9 0 0 | 9 5 0 |
| Jagersfontein, d., Orange, F. S. | 200,000 | 5 0 0 | 6 0 | Nov., 1889 | 29 7 6 | 29 12 6 |
| Jubilee, g., Transvaal | 50,000 | 1 0 0 | 5 0 | June, 1903 | 5 0 0 | 5 5 0 |
| Jumpers, Transvaal | 100,000 | 1 0 0 | 5 0 | Aug., 1809 | 3 12 6 | 3 17 6 |
| Langlaagte Est., g., Transvaal | 470,000 | 1 0 0 | 3 0 | Sept., 1903 | 4 0 0 | 4 2 6 |
| May Con., g., Transvaal | 288,750 | 1 0 0 | 3 0 | July, 1903 | 4 2 6 | 4 5 0 |
| Meyer & Charlton, g., Transvaal | 100,000 | 1 0 0 | 3 0 | Feb., 1903 | 5 7 6 | 5 12 6 |
| Modderfontein, g., Transvaal | 290,000 | 1 0 0 | rts. | Apr., 1902 | 9 16 3 | 9 18 9 |
| Namaqua, c., Cape Colony | 94,331 | 2 0 0 | 2 0 | June, 1902 | 2 17 6 | 3 2 0 |
| Primrose (New), g., Transvaal | 325,000 | 1 0 0 | 2 0 | Feb., 1903 | 2 16 3 | 2 18 9 |
| Rand Mines, g., S. Africa | 1,795,956 | 5 0 | 4 0 | June, 1902 | 10 1 3 | 10 3 9 |
| Robinson, g., Transvaal | 750,000 | 5 0 0 | 5 6 | Aug., 1903 | 10 8 9 | 10 11 3 |
| Robinson Deep, g., Transvaal | 950,000 | 1 0 0 | 10 0 | May, 1903 | 4 17 6 | 5 0 0 |
| Rose Deep, Transvaal | 425,000 | 1 0 0 | 2 0 | Feb., 1903 | 8 15 0 | 9 0 0 |
| Salisbury, g., Transvaal | 100,000 | 1 0 0 | 2 0 | Mar , 1889 | 2 10 0 | 2 12 6 |
| Sheba, g., Transvaal | 1,075,000 | 1 0 0 | 6 | July, 1898 | 19 6 1 | 0 6 |
| Village Main Reef, Transvaal | 400,000 | 1 0 0 | 5 0 | Oct., 1902 | 8 5 0 | 8 10 0 |
| Wemmer, Transvaal | 80,000 | 1 0 0 | 5 0 | May, 1903 | 11 15 0 | 12 5 0 |

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver. *Ex-Dividend.

## SALT LAKE CITY.* July 4.

| Name of Company | Par Val | Shares. | High | Low | Sales. |
|---|---|---|---|---|---|
| Ajax | $10 | 300,000 | .22 | .22 | 100 |
| Ben Butler | 1 | 500,000 | .13½ | .16 | 2,475 |
| California | 1 | 300,000 | .14½ | .14½ | 700 |
| Carisa | 1 | 500,000 | .08¼ | .09 | 750 |
| Century | ..... | ..... | .40½ | .43½ | 900 |
| Con. Mercur | 5 | 1,000,009 | 1.43 | 1.49 | 645 |
| Daly | 20 | 150,000 | ..... | ..... | ..... |
| Daly-Judge | 1 | 300,000 | 9.70 | 10.00 | 450 |
| Daly-West | 20 | 300,000 | 39.00 | 40.25 | 598 |
| Grand Central | 1 | 250,000 | 4.25 | 4.25 | 100 |
| L. Mammoth | 1 | 150,000 | 7.42 | .86 | 10,600 |
| L. Washington | ½ | 300,000 | ..... | ..... | ..... |
| Mammoth | 25 | 400,000 | ..... | ..... | ..... |

| Name of Company | Par Val | Shares | High | Low | Sales. |
|---|---|---|---|---|---|
| Majestic Cop | ..... | ..... | ..... | ..... | ..... |
| May Day | ¼ | 400,000 | .13 | .17 | 20.100 |
| N. Y. Bonanza | ..... | ..... | .29½ | .35 | 1,300 |
| Petro | 100 | 10,000 | ..... | ..... | ..... |
| Sacramento | 5 | 1,000,000 | .23 | .23⅛ | 21,400 |
| Silver Shield | ..... | ..... | .06⅛ | .08 | 1,750 |
| South Swansea | 1 | 300,000 | .17½ | .17½ | 300 |
| Star Con | 1 | 500,000 | .27½ | .28⅔ | 12,100 |
| Uncle Sam | 1 | 500,000 | .20 | .22⅜ | 6,100 |
| Utah | 10 | 100,000 | ..... | ..... | ..... |
| Victor | 1 | 500,000 | .19 | .19¼ | 2,200 |
| Wabash | ..... | ..... | .21½ | .26¾ | 5,200 |
| Yankee Con | 1 | 500,000 | .34 | .36 | 2,700 |

*By our Special Correspondent. All mines are in Utah. Total sales, 103,168 shares.

## LONDON (By Cable.)*

| Name of Company. | July 14. £. s. d. | July 21. £. s. d. |
|---|---|---|
| Anaconda | 4 5 0 | 4 5 0 |
| British South Africa | 2 15 0 | .. .. .. |
| Camp Bird | 1 9 5 | 1 7 6 |
| Con. Gold Fields | 6 16 3 | 6 16 3 |
| De Beers Con. def | 19 7 6 | 20 3 9 |
| East Rand | 7 6 3 | 7 7 6 |
| El Oro, Mex | 1 12 6 | 1 12 6 |

| Name of Company. | July 22. £. s. d. | July 22. £. s. d. |
|---|---|---|
| Jagersfontein | 29 0 0 | .. .. .. |
| Johannesburg Invest | 3 1 3 | .. .. .. |
| Modderfontein | 9 17 6 | 9 15 0 |
| Rand Mines | 10 2 6 | 10 3 9 |
| Rio Tinto, com | 46 10 0 | 46 0 0 |
| Simmer & Jack | 1 8 8 | 1 7 7 |
| Tomboy | 1 13 0 | 1 13 1½ |

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

## ST. LOUIS, MO.

| Name. | Par Val. | Shares. | Prices. Bid. | Prices. Ask. |
|---|---|---|---|---|
| Am.-Nettie, Colo | $10 | 300,000 | $0.45 | $0.70 |
| Catherine Lead, Mo. | 10 | 50,000 | 1.50 | 3.00 |
| Central Coal & C | 100 | 51,250 | 62.00 | 63.00 |
| Central C. & C., pf. | 100 | 18,750 | 73.50 | 74.00 |
| Central Lead, Mo | 10 | 100,000 | 120.00 | 130.00 |

| Name. | Par Val. | Shares. | Prices. Bid. | Prices. Ask. |
|---|---|---|---|---|
| Columbia Lead, Mo. | $10 | 50,000 | $12.00 | 13.00 |
| Con. Coal, Ill. | 100 | 50,000 | 22.50 | 23.00 |
| Doe Run Lead Co. | 100 | 15,000 | 107.00 | 110.00 |
| Granite Bimet, Mt. | 10 | 100,000 | .60 | .68 |
| St. Joe Lead, Mo, | 10 | 600,000 | 16.00 | 17.00 |

*By our Special Correspondent.

## PARIS. July 11.

| Name of Company. | Country. | Product. | Capital Stock. Francs. | Par value. Fr. | Latest divs. Fr. | Prices. Opening. Fr. | Prices. Closing. Fr. |
|---|---|---|---|---|---|---|---|
| Boleo | Lower Cal. | Copper | ..... | 500 | 176.00 | 1,361.00 | 1,405.00 |
| Champ d'Or | S. Africa | Gold | 3,375,000 | 25 | 3.75 | 19.75 | 19.75 |
| Fraser River | Brit. Col'mb. | Gold | 250,000 | 25 | ..... | 6.50 | 5.50 |
| Huanchaca | Bolivia | Silver | 40,000,000 | 125 | 5.00 | 93.75 | 88.50 |
| Laurium | Greece | Zinc, Lead | 16,300,000 | 500 | 25.00 | 339.00 | 031.50 |
| Metaux, Cie. Fran. de | France | Metal dealers. | 25,000,000 | 500 | 22.50 | 467.00 | 470.00 |
| Nickel | N. Caled'nia. | Nickel | 15,000,000 | 250 | 22.50 | 461.00 | 441.00 |
| Sedalia & California | Calif., U. S. | Oil | 1,000,000 | 1 | ..... | 8.25 | 7.50 |
| Vielle Montagne | Belgium | Zinc | 9,000,000 | 30 | 30.00 | 654.00 | 663.50 |

## PHILADELPHIA, PA.*

| Name and Location of Co. | Par val. | July 15. H. | July 15. L. | July 16. H. | July 16. L. | July 17. H. | July 17. L. | July 18. H. | July 18. L. | July 20. H. | July 20. L. | July 21. H. | July 21. L. | Sales |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Am. Alkali, Mich | $50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Am. Cement | 10 | 7⅛ | ..... | 7⅛ | 7⅝ | 7⅝ | ..... | 7⅝ | ..... | 7⅝ | ..... | 7⅝ | 7 | 1,190 |
| Cambria Iron, Pa | 50 | 47 | 46⅛ | ..... | ..... | 46½ | ..... | ..... | ..... | 47 | 46⅛ | 46½ | ..... | 175 |
| Cambria S., Pa | 50 | 22⅛ | 22 | 22⅛ | 22 | 22½ | 22⅝ | 22¾ | 22½ | 22¾ | 22¼ | 22⅛ | 22½ | 9,098 |
| Penn. Steel, pfd | 100 | ..... | ..... | ..... | ..... | 1⅛ | ..... | 1⅛ | ..... | 1⅛ | 1 | 1 | ..... | 1,310 |
| Susq. I. & S., Pa | 5 | 1⅛ | 1 1/16 | 1 1/16 | ..... | ..... | ..... | ..... | ..... | 1⅛ | 1 | 1 | ..... | 1,310 |
| United Gas I. Pa | 50 | 84 | 81 | 83 | 82¼ | 83⅞ | 82¾ | 84½ | 84 | 84 | 82⅞ | 83⅛ | 82 | 9,559 |
| Warwick I. & S. | 10 | 4½ | 4¾ | ..... | ..... | 4½ | 4¾ | ..... | ..... | 4⅞ | ..... | ..... | ..... | 410 |

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 10,463 shares,

## TORONTO, ONT.*

| Name of Company. | Par val | Prices. High. | Prices. Low. | Sales. |
|---|---|---|---|---|
| Black Tail | $1 | .04 | .02 | ..... |
| Cariboo (Mc. K.) | 1 | .13 | .10 | ..... |
| Cariboo (Hyd.) | 1 | .75 | ..... | ..... |
| Center Star | 1 | .28 | .24 | ..... |
| Crows Nest, C. | 100 | 3.80 | 2.75 | ..... |
| Dominion Coal, com. | 100 | 1.00 | .96 | ..... |
| Dominion S. & I. | 100 | .15½ | .13¾ | ..... |
| Dominion S. & I., pref. | 100 | ..... | ..... | ..... |
| Fairview | 1 | .05¼ | .04 | ..... |
| Giant | 1 | .04 | .03 | 6,500 |

| Name of Company. | Par val | Prices. High. | Prices. Low. | Sales. |
|---|---|---|---|---|
| Granby Smelter | $10 | 4.75 | 2.75 | ..... |
| Mountain Lion | 1 | .28 | .20 | ..... |
| North Star | 1 | .14 | .10½ | ..... |
| Nova Scotia Steel, com | 100 | .96¾ | .90½ | ..... |
| Payne | 1 | .26 | .17 | ..... |
| Rambler Cariboo | 1 | .40 | ..... | ..... |
| Republic | 1 | .04 | .02 | ..... |
| St. Eugene | 1 | .48 | .40 | ..... |
| Virtue | 1 | .07 | .04 | ..... |
| War Eagle Con. | 1 | .14 | .10 | 10,500 |

*Standard Stock and Mining Exchange. Total sales, 17,000 shares.

# CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

**(See also Market Reviews.)**

| | Cust. Meas. | Price. |
|---|---|---|
| **ABRASIVES—** | | |
| Carborundum, f.o.b. Niagara Falls, Powd., F. FF. FFF. | lb. | $0.08 |
| Grains | " | .10 |
| Corundum, N. C. | " | .07@.10 |
| Chester, Mass. | " | .04½@.05 |
| Barry's Bay, Ont. | " | .07½@.09¼ |
| Mont. car-lots, f.o.b. Chicago | " | .07@.07½ |
| Crushed Steel, f.o.b. Pittsburg | " | .05½ |
| Emery, Turkish flour in kegs | " | .03¼ |
| Grains, in kegs | " | .05@.05½ |
| Naxos flour, in kegs | " | .03½ |
| Grains, in kegs | " | .05@.05½ |
| Chester flour, in kegs | " | .03½ |
| Grains, in kegs | " | .05@.05½ |
| Peekskill, f.o.b. Easton, Pa., flour, in kegs | " | .01¾ |
| Grains, in kegs | " | .02¼ |
| Crude, ex-ship N. Y.; Abbott (Turkey) | lg. ton | 26.50@30.00 |
| Kuluk (Turkey) | " | 22.00@24.00 |
| Naxos (Greek) h. gr | " | 26.00 |
| Garnet, as per quality | sh. ton | 25.00@35.00 |
| Pumice Stone, Am. Powd | lb. | .01½@.02 |
| Italian, powdered | " | .01½ |
| Lump, per quality | " | .04@.40 |
| Rottenstone, ground | " | .02¼@.04½ |
| Lump, per quality | " | .06@.20 |
| Rouge, per quality | " | .10@.30 |
| Steel Emery, f.o.b. Pittsburg | " | .07 |
| **ACIDS—** | | |
| Boracic, crystals | " | .10¾@.11 |
| Powdered | " | .11¼@.11½ |
| Carbonic, liquid gas | " | .12½ |
| Chromic, crude | " | .20 |
| Hydrofluoric, 30% | " | .03 |
| 48% | " | .05 |
| 60% | " | .11 |
| Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J. | " | .06 |
| **ALCOHOL**—Grain | gal. | 2.39@2.40 |
| Refined wood, 95@97% | " | .60@.65 |
| Purified | " | 1.20@1.50 |
| **ALUM**—Lump | 100 lbs. | 1.75 |
| Ground | " | 1.85 |
| Porous | " | .80 |
| Powdered | " | 3.00 |
| Chrome, com'l | " | 2.75@3.00 |
| **ALUMINUM—** | | |
| Nitrate | lb. | 1.50 |
| Oxide, com'l, common | " | .06¼ |
| Best | " | .20 |
| Pure | " | .80 |
| Hydrated | 100 lbs. | 2.60 |
| Sulphate, com'l | " | 1.25@1.50 |
| **AMMONIA—** | | |
| Aqua, 16° | lb. | .03 |
| 18° | " | .03¼ |
| 20° | " | .03¾ |
| 26° | " | .04½ |
| **AMMONIUM—** | | |
| Carbonate, lump | " | .07¼ |
| Powdered | " | .08¼ |
| Muriate | " | .05⅝ |
| Lump | " | .09 |
| Nitrate, white pure (99%) | " | .12 |
| Phosphate, com'l | " | .09 |
| Pure | " | .12 |
| **ANTIMONY**—Glass | " | .30@.40 |
| Needle, lump | " | .05½@.06 |
| Powdered, ordinary | " | .05¾@.07¾ |
| Oxide, com'l white, 95% | " | .09½ |
| Com'l white, 95% | " | .12 |
| Com'l gray | " | .07 |
| Sulphuret, com'l | " | .16 |
| **ARSENIC**—White powd. | " | .02¾@.03 |
| Red | " | .06⅜@.06½ |
| **ASPHALTUM—** | | |
| Ventura, Cal. | sh. ton | 32.00 |
| Cuban | lb. | .01½@.03½ |
| Egyptian, crude | " | .05½@.06 |
| Trinidad, refined | sh. ton | 35.00 |
| San Valentino (Italian), | lg. ton | 16.00 |
| Seyssel (French), mastic | sh. ton | 21.00 |
| Gilsonite, Utah, ordinary | lb. | .03 |
| Select | " | .03¾ |
| **BARIUM—** | | |
| Carb. Lump, 80@90% | sh. ton | 25.00@27.00 |
| 92@98% | " | 26.00@29.00 |
| Powdered, 80@90% | lb. | .01¾@.02 |
| Chloride, com'l | 100 lbs. | 1.67½@1.76 |
| Chem. pure cryst | lb. | .05 |
| Nitrate, powdered | " | .05¾ |
| **BARIUM** | Cust. Meas. | Price. |
| Sulphate (Blanc Fixe) | lb. | $0.01⅞ |
| **BARYTES—** | | |
| Am. Crude, No. 1 | sh. ton | 7.00 |
| Crude, No. 2 | " | 8.00 |
| Crude, No. 3 | " | 7.75 |
| Floated | " | 18.50 |
| Foreign gray | " | 13.50 |
| Snow white | " | 17.00 |
| Floated | " | 19.00 |
| **BAUXITE**—Ga. or Ala. Mines: | | |
| First grade | lg. ton | 5.50 |
| Second grade | " | 4.75 |
| **BISMUTH**—Subnitrate | lb. | 2.00 |
| Subcarbonate | " | 2.25 |
| **BITUMEN**—"B" | " | .03½ |
| "A" | " | .05 |
| **BONE ASH** | " | .02¼@.02½ |
| **BORAX** | " | .07¼@.07½ |
| **BROMIDE**—Bulk | " | .48 |
| **CADMIUM**—Metallic | " | 1.40 |
| Sulphate | 100 lbs. | 2.00@2.50 |
| **CALCIUM**—Acetate, gray | " | 1.40 |
| " brown | " | .95 |
| Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J. | sh. ton | 70.00 |
| Carbonate, ppt. | lb. | .05 |
| Chloride | 100 lbs. | .70@.90 |
| **CEMENT—** | | |
| Portland, Am., 400 lbs. | bbl. | 2.00@2.15 |
| Foreign | " | 1.95@2.50 |
| "Rosendale," 300 lbs. | " | .80 |
| Slag cement | " | 1.50@1.60 |
| **CERESINE—** | | |
| Orange and Yellow | lb. | .13 |
| White | " | .14 |
| **CHALK**—Lump, bulk | sh. ton | 3.25 |
| Ppt. per quality | lb. | .04@.05¼ |
| **CHLORINE**—Liquid | " | .30 |
| Water | " | .10 |
| **CHROME ORE** | | |
| (50% ch.) ex-ship N. Y. | lg. ton | 24.75 |
| Bricks f.o.b. Pittsburg | M | 175.00 |
| **CLAY, CHINA**—Am. com., ex-dock, N. Y. | lg. ton | 8.25 |
| Am. best, ex-dock, N. Y. | " | 9.25 |
| English, common | " | 10.50 |
| Best grade | " | 16.25 |
| Fire Clay, ordinary | sh. ton | 4.25 |
| Best | " | 6.00 |
| Slip Clay | " | 5.00 |
| **COAL TAR PITCH** | gal. | .08 |
| **COBALT**—Carbonate | lb. | 1.75 |
| Nitrate | " | 1.50 |
| Oxide - Black | " | 2.26@2.30 |
| Gray | " | 2.28@2.40 |
| Smalt, blue ordinary | " | .06 |
| Best | " | .20 |
| **COPPERAS**—Bulk | 100 lbs. | .47½ |
| In bbls. | " | .52½ |
| **COPPER**—Carbonate | lb. | .18@.19 |
| Chloride | " | .25 |
| Nitrate, crystals | " | .35 |
| Oxide, com'l | " | .19 |
| **CRYOLITE** | " | .06½ |
| **EXPLOSIVES—** | | |
| Blasting powder, A | 25-lb. keg | .65 |
| Blasting powder, B | " | 1.40 |
| "Rackarock," A | lb. | .25 |
| "Rackarock," B | " | .18 |
| Judson R.R. powder | " | .10 |
| Dynamite (20% nitro-glycerine) | " | .13 |
| (30% nitro-glycerine) | " | .14 |
| (40% nitro-glycerine) | " | .15 |
| (50% nitro-glycerine) | " | .16½ |
| (60% nitro-glycerine) | " | .18 |
| (75% nitro-glycerine) | " | .21 |
| Glycerine for ultro (32-2-10° Be.) | " | .13¼@.13⅞ |
| **FELDSPAR**—Ground | sh. ton | 8.00@9.00 |
| **FLINT PEBBLES**—Dan. Best | lg. ton | 14.75 |
| French, Best | " | 11.75 |
| **FLOURSPAR—** | | |
| Am. lump, 1st grade | sh. ton | 14.40 |
| 2d grade | " | 13.90 |
| Gravel and crushed, 1st gr. | " | 13.40 |
| 2d grade | " | 12.40 |
| Ground, 1st grade | " | 17.90 |
| Ground, 2d grade | " | 16.50 |
| Foreign, lump | " | 8.00@12.00 |
| Ground | " | 11.50@14.00 |
| **FULLER'S EARTH** | 100 lbs. | .80 |
| **GRAPHITE**—Am. f.o.b. Providence, R. I., lump | sh. ton | $8.00 |
| Pulverized | " | 30.00 |
| Am. pulv., other than R. I., f. o. b., New York | " | 45.00 |
| Best flake | " | 150.00 |
| German, com. pulv | lb. | .01¼@.01½ |
| Best pulverized | " | .01½@.02 |
| Ceylon, common pulv | " | .02¾@.03½ |
| Best pulverized | " | .04@.08 |
| Italian, pulv | " | .01¾ |
| **GYPSUM**—Ground | sh. ton | 8.00@8.50 |
| Fertilizer | " | 7.00 |
| Rock | lg. ton | 4.00 |
| English and French | " | 14.00@16.00 |
| **INFUSORIAL EARTH**—Gr'd. | | |
| American best | " | 20.00 |
| French | " | 37.50 |
| German | " | 40.00 |
| **IODINE**—Crude | 100 lbs. | 2.45 |
| **IRON**—Muriate | lb. | .05 |
| Nitrate, com'l | " | .01¾ |
| True | " | .04 |
| Oxide, pure copperas color | " | .05@.10 |
| Purple-brown | " | .02 |
| Venetian red | " | .01@.01½ |
| Scale | " | .01@.03 |
| **KAOLIN**—(See China Clay.) | | |
| **KRYOLITH**—(See Cryolite.) | | |
| **LEAD**—Acetate, white | " | .08¼@.08½ |
| Brown | " | .06¼@.06½ |
| Nitrate, com'l | " | .06½ |
| " gran. | " | .08¼ |
| **LIME**—Com., abt. 250 lbs. | bbl. | .75 |
| Finishing | " | .95 |
| **MAGNESITE**—Greece. | | |
| Crude (95%) | lg. ton | 5.50@6.00 |
| Calcined | sh. ton | 15.50 |
| Bricks, best imp., f.o.b. N.Y. | M. | 155.00 |
| " domes., per qual., f.o.b. Pittsburg | " | 180.00@200.00 |
| **MAGNESIUM—** | | |
| Carbonate, light, fine pd. | lb. | .05 |
| Blocks | " | .07@.09 |
| Chloride, com'l | " | .01¾ |
| Fused | " | .20 |
| Nitrate | " | .60 |
| Sulphate | 100 lbs. | .75@.95 |
| **MANGANESE—** | | |
| Crude powd. | | |
| 70@75% binoxide | lb. | .01¼@.01½ |
| 75@85% binoxide | " | .01½@.02¼ |
| 85@90% binoxide | " | .02¼@.03¼ |
| 90@95% binoxide | " | .03¼@.05½ |
| Carbonate | " | .16@.20 |
| Chloride | " | .04 |
| Ore, 5%, Foreign | unit | .18@.19 |
| Domestic | " | .30 |
| **MARBLE**—Flour | sh. ton | 6.00@7.00 |
| **MERCURY**—Bichloride | lb. | .77 |
| **MICA**—N. Y. gr'nd, coarse | sh. ton | 33.00@38.00 |
| Fine | lb. | .00⅞@.02 |
| Sheets, N. C., 2x4 in. | " | .30 |
| 3x3 in | " | .80 |
| 3x4 in. | " | 1.50 |
| 4x4 in. | " | 2.00 |
| 6x6 in. | " | 3.00 |
| **MINERAL WOOL—** | | |
| Slag, ordinary | sh. ton | 19.00 |
| Selected | " | 25.00 |
| Rock, ordinary | " | 32.00 |
| Selected | " | 40.00 |
| **NICKEL** Oxide, No. 1 | lb. | 1.00 |
| No. 2 | " | .60 |
| Sulphate | " | .20@.21 |
| **OILS**—Black, reduced 29 gr.: | | |
| 25@30, cold test | gal. | .13@.13½ |
| 15, cold test | " | .13½@.14 |
| Zero | " | .18@.18½ |
| Summer | " | .12½@.13 |
| Cylinder, dark steam ref. | " | .14½@.15 |
| Dark, filtered | " | .18½@.19 |
| Light, filtered | " | .20½@.20 |
| Extra cold test | " | .25@.31 |
| Gasoline, 86°@90° | " | .16@.21 |
| Naphtha, crude, 68°@72° | bbl. | 11.20 |
| "Stove" | gal. | .14½ |
| Linseed, domestic raw | " | .37@.40 |
| Boiled | " | .42 |
| Calcutta, raw | " | .75 |
| **OZOKERITE** | lb. | .11½ |
| **PAINTS AND COLORS—** | | |
| Chrome green, common | " | .08 |
| Pure | " | .16 |
| Yellow, common | " | .10¼ |
| Best | " | .14 |
| Lampblack, com'l | " | .04½ |
| Refined | " | .07 |
| Litharge, Am. pow'd | " | .05⅞@.06 |
| English flake | " | .08¼@.08½ |
| Glassmakers' | " | .06½@.08¼ |
| **PAINTS AND COLORS—** | Cust. Meas. | Price. |
| Metallic, brown | sh. ton | $19.00 |
| Red | " | 15.00 |
| Ocher, Am. common | " | 9.25@10.00 |
| Best | " | 21.25@25.00 |
| Dutch, washed | lb. | .04¾ |
| French, washed | " | .01½@.01⅞ |
| Orange mineral, Am. | " | .08½@.08¾ |
| Foreign, as to make | " | .08¼@.10 |
| Paris green, pure, bulk | " | .12 |
| Red lead, American | " | .06¼@.06⅝ |
| Foreign | " | .06⅝@.06⅞ |
| Turpentine, spirits | gal. | .51@.51½ |
| White lead, Am., dry | lb. | .05½@.05¾ |
| American, in oil | " | .07@.09 |
| Foreign, in oil | " | .07@.07½ |
| Zinc, white, Am., ex. dry | " | .04⅝@.04¾ |
| Foreign, red seal, dry | " | .06@.06½ |
| Green seal, dry | " | .06¼@.06½ |
| **POTASH—** | | |
| Caustic, ordinary | " | .04½@.04¾ |
| Elect. (90%) | " | .06¼ |
| **POTASSIUM—** | | |
| Bicarbonate cryst. | " | .08¼ |
| Powdered or gran. | " | .14 |
| Bichromate, Am | " | .08⅛@.08¼ |
| Scotch | " | .08½@.09 |
| Bromide | " | .25@.38 |
| Carbonate (80@85%) | " | .03½@.04¾ |
| Chlorate, powd. | " | .07¼@.07⅜ |
| Crystals | " | .07@.07½ |
| Chromate | " | .35 |
| Cyanide (98@99%) | " | .20 |
| Kainit | lg. ton | 9.30 |
| Manure salt, 20% | 100 lbs. | .66 |
| D'le Manure Salt, 48@53% | " | 1.12 |
| Muriate, 80@85% | " | 1.83 |
| 95% | " | 1.86 |
| Permanganate | lb. | .09½@.09⅝ |
| Prussiate, yellow | " | .13¼@.13½ |
| Red | " | .34 |
| Sulphate, 90% | 100 lbs. | 2.11 |
| 96% | " | 2.14 |
| Sylvanit | unit | .41 |
| **QUARTZ**—(See Silica). | | |
| **SALT**—N. Y. com. fine 280 lbs | bbl. | .72@1.18 |
| N. Y. agricultural | sh. ton | 4.40 |
| **SALTPETRE**—Crude | 100 lbs. | 3.20@3.35 |
| Refined | " | 4.00@4.50 |
| **SILICA**—Best fcreign | lg. ton | 10.00@11.00 |
| Ground quartz, ord. | sh. ton | 6.00@8.00 |
| Best | " | 12.00@13.00 |
| Lump quartz | " | 2.50@4.00 |
| Glass sand | " | 2.75 |
| **SILVER**—Chloride | oz. | .65 |
| Nitrate Crystals | " | .33½ |
| Oxide | " | .85@1.10 |
| **SODIUM—** | | |
| Bicarb., ordinary, f.o.b. wk's. | 100 lbs. | 1.25 |
| Extra domes., f.o.b. w'ks. | " | 3.50 |
| Foreign, f.o.b. N. Y. | " | 1.60 |
| Bichromate | lb. | .06¼ |
| Carbonated ash, high test, in bags, f.o.b. works | 100 lbs. | .75@.85 |
| Foreign, f.ob. N. Y. | " | .90@.92½ |
| Caustic, 60@76%, f.o.b. w'ks. | " | 1.65@1.70 |
| Foreign, f.o.b N. Y. | " | 1.50@2.00 |
| Chlorate, com'l | " | .07¼@.07⅜ |
| Hyposulphite, Am. | " | 1.60@1.65 |
| German | " | 1.70@1.90 |
| Nitrate, spot | " | 2.05 |
| Shipments | " | 2.00 |
| Peroxide | lb. | .45 |
| Phosphate | " | .02½@.02¼ |
| Prussiate | " | .09¾ |
| Sal soda, f.o.b. works | 100 lbs. | .60 |
| Foreign, f.o.b. N. Y. | " | .67½ |
| Silicate, conc | lb. | .05 |
| Com'l | " | .01 |
| Sulphate, com'l | 100 lbs. | .82½ |
| Sulphide | lb. | .01¼ |
| Sulphite crystals | " | .02½ |
| **SULPHUR**—Roll | 100 lbs. | 1.85 |
| Flour | " | 1.90 |
| Flowers, sublimed | " | 2.15 |
| **TALC**—N. C., 1st grade | sh. ton | 20.00 |
| N. Y., Fibrous, best | " | 19.28 |
| French, best | 100 lbs. | 2.25 |
| Italian, best | " | 2.62½ |
| **TAR**—Regular | bbl. | 2.40 |
| Oil | " | 4.10 |
| **TIN**—Crystals | lb. | .22½@.23 |
| Oxide | " | .35 |
| **URANIUM**—Oxide | " | 2.25@3.00 |
| **ZINC**—Metallic, ch. pure | " | .07@.09⅜ |
| Carbonate, ppt. | " | .09 |
| Chloride solution, com'l | " | .09½ |
| Chloride granular | " | .04¼@.04¾ |
| Dust | " | .04⅜@.04¾ |
| Sulphate | " | .02¼@.02¾ |

## THE RARE EARTHS.

| | | |
|---|---|---|
| **BORON**—Nitrate | lb. | $1.50 |
| **CALCIUM**—Tungstate (Scheelite) | " | .30 |
| **CERIUM**—Nitrate | " | 10.00 |
| **DIDYMIUM**—Nitrate | " | 35.00 |
| **ERBIUM**—Nitrate | " | 40.00 |
| **GLUCINUM**—Nitrate | " | 20.00 |
| **LANTHANUM**—Nitrate | " | 30.00 |
| **LITHIUM**—Carbonate | " | 1.35 |
| **LITHIUM**—Nitrate | oz. | .90 |
| **STRONTIUM**—Nitrate | lb. | .07⅛@.08⅛ |
| **THORIUM**—Nitrate 49@50%. | " | 4.50 |
| **URANIUM**—Nitrate | oz. | .25 |
| **YTTRIUM**—Nitrate | lb. | 40.00 |
| **ZIRCONIUM**—Nitrate | " | 8.00 |

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.